EFFECT OF EXCHANGE RATE ON TRADE BALANCE IN TANZANIA

1970 -2014

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DISSERTATION SUBMITED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ECONOMICS OF THE OPEN UNIVERSITY OF TANZANIA.

2015

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by the Open University of Tanzania a dissertation titled: effect of exchange rate and trade balance in Tanzania economy for the period of 1970-2014, in partial fulfillment of the requirements for the Master of Economics.

Prof, Deus Ngaruko

(Supervisor)

Date ----------

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DECLARATION

I, **Nassoro Said Mganza** declare that this dissertation is my own original work and that is has not been submitted and will not be presented to any other University and High learning Institution for similar or any other degree award.

Signature…….

Date ……

DEDICATION

This work is dedicated to several people who hold a very special place in my life: My beloved God for everything givers, my beloved Farther Mr. Said Ally Mganza and my late mother, for inspiring my love school. My Wife Rukia Juma Kambenga for her love, patience, support and encouragement in the entire period of my study. The entire families of Galila wabanhu and Kidifu Stationery and the Bank of Tanzania (BOT) staff for their moral and material support throughout the duration of my study.

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ABSTRACT

The study focuses on the analysis the relationship between exchange rate change and Trade balances in Tanzania for the period 1970-2014, specifically this study focus on the main effects of Trade deficit in Tanzania by analyzing the effect of Real exchange rate (RER), Tanzania Gross domestic income (TGDP), Real world income (WGDP), Consumer price index (CPI), Trade balance (TB) *etc*. In this study The Regression method under the STATA version 09 software has been used for the econometric analysis with a sample period spanning from 1970-2014. The literature reviews of the previous researchers have the mixed results on the factors in questions. However this study tried to use more variables that have rarely been explored specifically in Tanzania and found out that the main influencing factors for the case of Tanzania are Real exchange rate (RER), Tanzania Gross domestic income (TGDP), Real world income (WGDP), Consumer Price Index (CPI), Trade balance (TB) so suggested policy measures should focus on them to reduce the trade deficit in the Tanzanian economy.

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LIST OF ABBREVIATIONS

ADF	Augmented Dicky-Fuller test
AIC	Akaike's Information Criteria
ARDL	Autoregressive Distributed Lag
BOT	Bank of Tanzania
CVAR	Co-integrated Vector Auto regression
EAC	East African Community
ECD	Economics of Development
EPPO	Export Promotion Programs Office
EPZ	Export Promotion zone
FPE	Final Prediction Error
GDP	Gross Domestic Product
IMF	International Monetary Fund
KPSS	Kwiatkowski- Phillips –Schmidt-Shinn
MOF	Ministry of Finance
NBS	National Bureau of Statistics
OECD	Organization of Economic Cooperation and Development
OLS	Ordinary Least Squares
PP	Phillips-Perron test
RER	Real Exchange Rate
SAPs	Structural Adjustments Programs
TB	Trade Balance
USA	United States of America
VAR	Vector Autoregressive
VECM	Vector Error Correction Model

CHAPTER ONE

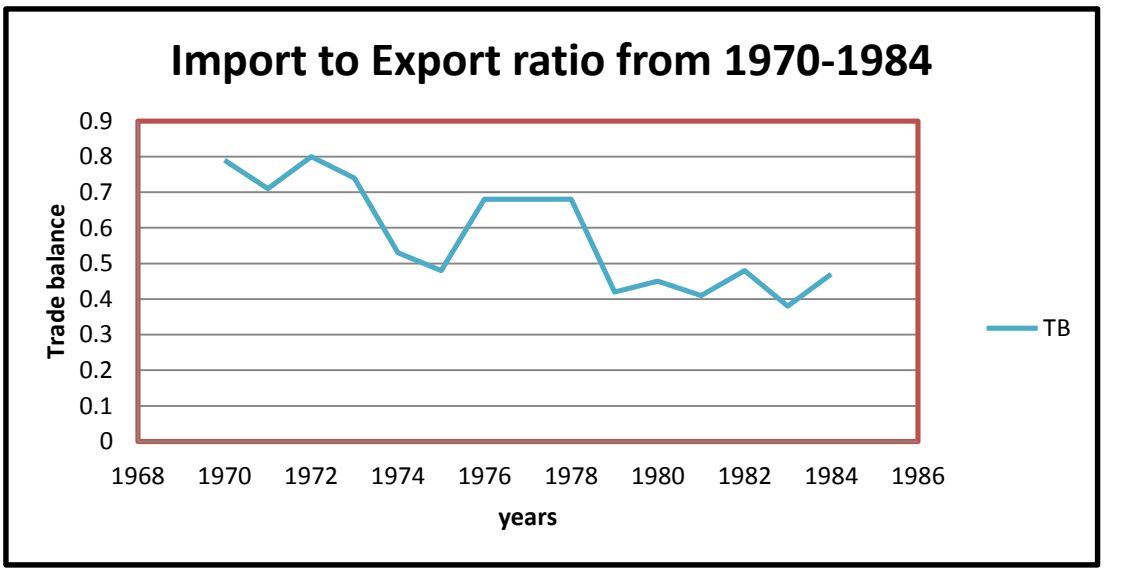
INTRODUCTION

1.0 Background of the study.

Exchange rate and domestic policies have a great impact on trade balance and economic growth Since independent 1961, Tanzania has pursued diverse economic policies aimed at improving exchange rate on trade balance and enhance economic development Saruni M,(2006). Domestic policies involved included:- Exchange rates; tariff structure; export taxation; import control; foreign exchange allocation systems; and adjustment policies to external policies. Trade policy instruments (Tariff-based instrument, TBI) have also been used, but in line with international obligations and regional settings to influence the direction/pattern of trade development; the aim of these trade policy instruments were: Stimulate Gross domestic production and improve export for domestic product.

The trading activities of Tanzania and other countries in the period 1970 to 2014 were not impressive as indicated by export to import ratio of less than unity as shown in Table1. This suggests that Tanzania suffered a negative trade balance for more than forty years although its exchange rate has been depreciating and appreciating. May be there are factors affecting the trade balance such as world income and Domestic income. This has attracted me to study how exchange rate and those factors have affected trade balance and its contribution to the economy of the country through trade balance.

Figure1.0 Export to import ratio



Source: researcher construction 2015

Figure2.0 Export to import ratio

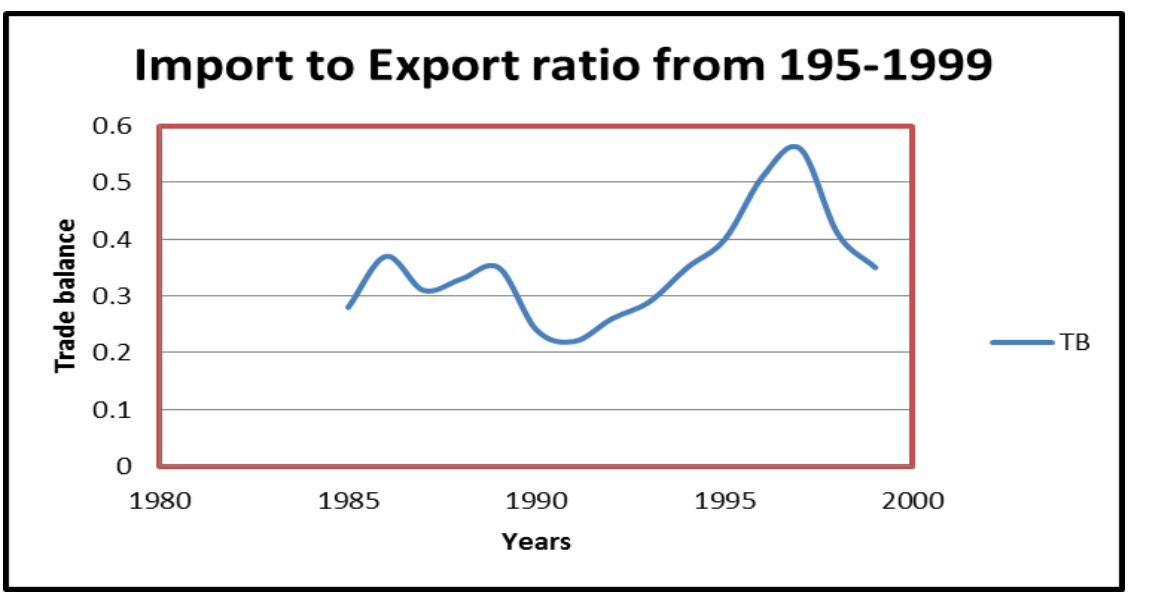
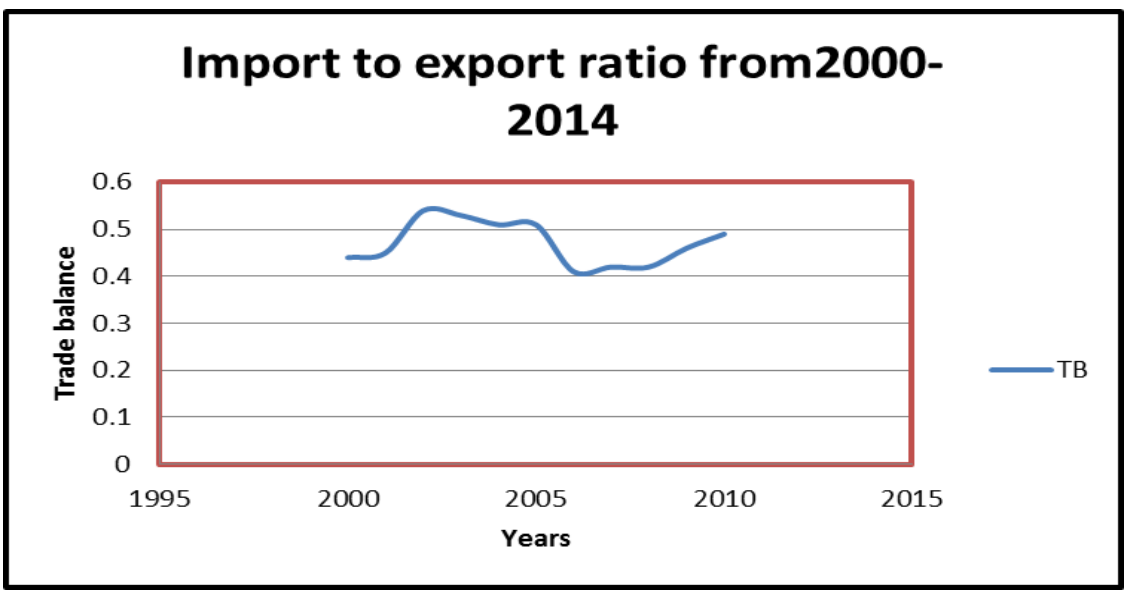


Figure3.0 Export to import ratio



1.1 Three Trade regimes affected by exchange rate in Tanzania.

1.1.1 The pre-Arusha era (1967)

This was liberal one inherited from colonial era; Private sector played a big role as engine of growth. Export was basically unprocessed/semi-processed agricultural commodities (Traditional exports) and other raw materials. Economic policies, which had been pursued by the colonial power. Peasant agriculture was encouraged by conventional measures. Industrial development was promoted with a relatively mild import substitution policy and relied on private investors (Anders D, 1999). The economy remained fairly open and was highly dependent on revenue from commodity exports. During the Pre-Arusha period 1961-1967 per capita incomes grew by 2% per year, the highest rate of any period in independent Tanzania. Capital formation increased steadily between 1963 and 1967. This was also a period of macroeconomic

stability with mostly low inflation and a satisfactory balance of payments (Ibid). However, the government was not content and argued that inequalities had increased, that industrial growth and inflow of external resources failed to meet expectations. President Nyerere felt that a new strategy was necessary to speed up development,(Ibid)

1.1.2 Post Arusha declaration

The Arusha Declaration in 1967 was a watershed in Tanzanian political and economic history. It meant that President Nyerere and the ruling party left the cautious course pursued during the first period after independence and launched the strategy of "African socialism", where the government was to take control of the commanding heights of the economy. There was a concern that the external dependence was too high, and that it was necessary to create an internally integrated economy. The necessary structural transformation was to be facilitated by increased state control (Anders D, 1994).

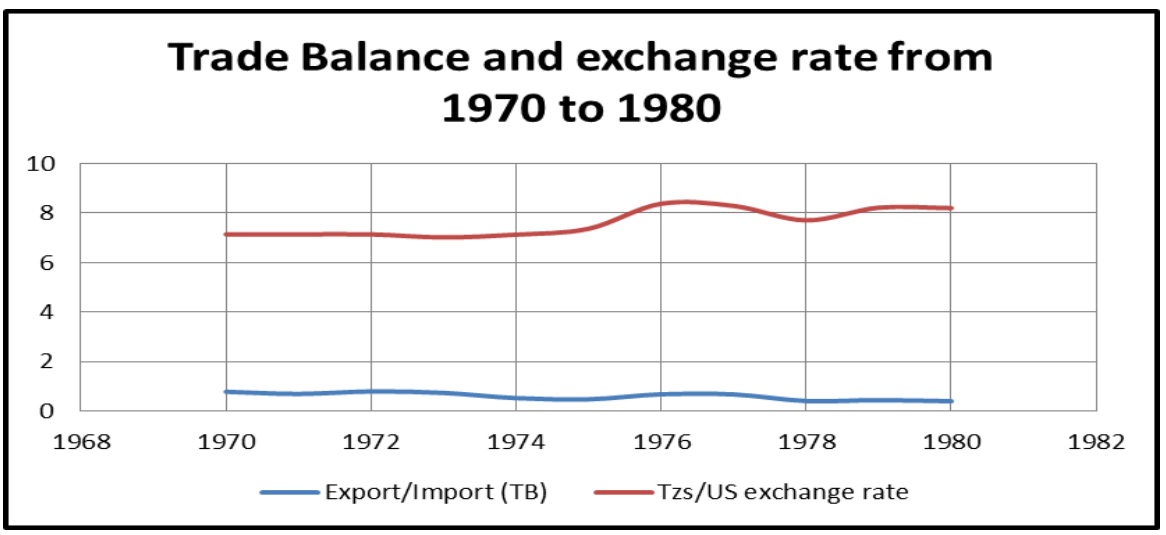
By the early 1970s, the Government had consolidated its hold on most parts of formal economic activity. Banking and large portions of the industrial sector had been nationalized, the bulk of international trade and private retail trade had been confined to state agencies, and market prices had largely been replaced by administered prices. A foreign exchange allocation system was developed in response to the balance of payments crises of 1970-71 and 1974-75, and in 1974 a National Price Commission was established that by the late 1970s was setting prices on some two thousand goods. During the pre-crisis period per capita incomes grew by 0.7% per year. The growth was led by the public administration sector, with sizeable contributions from agriculture and manufacturing. Tanzania's export, dominated by traditional agricultural exports such as coffee and cotton, stagnated (World Bank report, 1998).

1.1.3 Liberalization and Structural Adjustment (SAP)

SAP was introduced in the 1980's, following severe macroeconomic imbalances which Tanzania started to experience like rising inflation rate, falling real GDP growth rate, widening fiscal and trade deficits. Trade liberalization as one of the SAP's concern was adopted effectively from 1993 following the failure of the restrictive policies to achieve the desired objectives Saruni M, (2006).

1.2 Trade Balances and economic Performances in the period 1970-1980

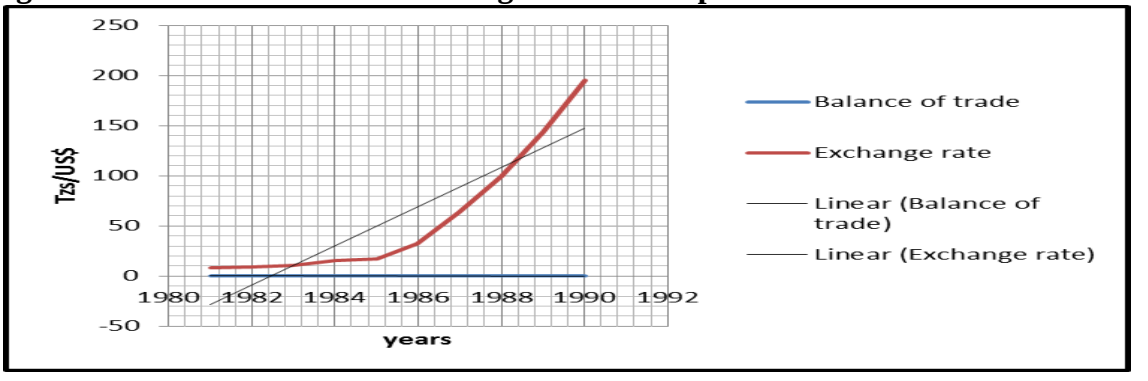
In this period Tanzania suffered a several trade deficit as the trade balance widened or export to import ratio decreased as shown in Figure1.4 below. However the exchange rate in the year 1970 to 1972 was not changed, then we can say that the authorities concerned did not take measures to improve the trade balance through exchange rate. While in the next two years (1973 to 1974) Tanzania`s exchange rate appreciated which affected trade balance negatively (BOT, 1976).



1.1.2 Trade balance and Economic performance in period 1981 to 1990

In this period, Tanzania continued to suffer from trade deficit as shown by Figure 1.5 below. We can say that on average the trade balance worsen though the effort made to depreciate the exchange rate to improve the trade balance did not help. In some years we have provided the reasons for the fluctuations.

Figure1.5: Trade balance and exchange rate for the period 1981 to 1990

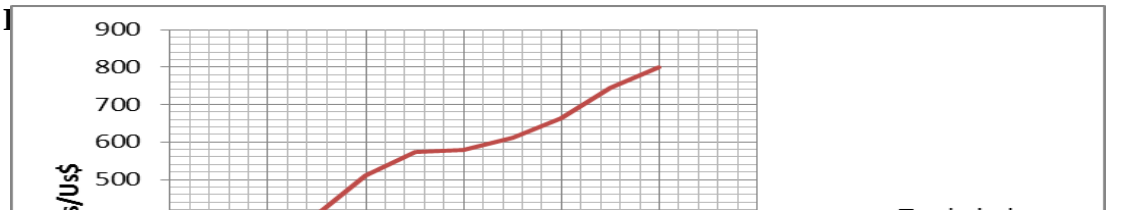


1.2.1Trade balance and Economic performance in the period 1991 to 2000

In this period there was improvement in trade balance, especially from 1991-1995 but for the next four years, the trade balance deteriorated. While in the year 2000 there was little improvement due to the improvement of agricultural export during that year and other factors.

1.2.2 Trade balance and Exchange rate for the period 1991 to 2000

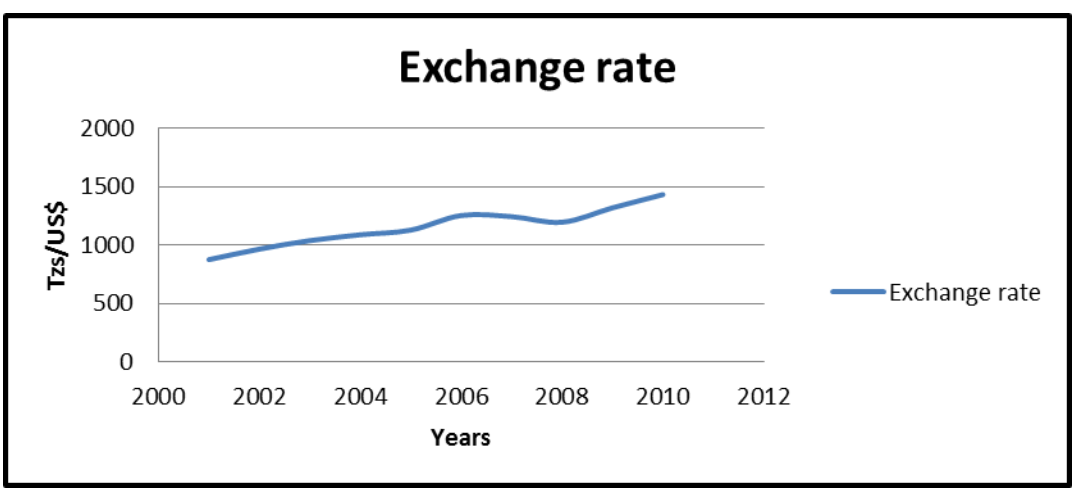
The deficit in the trade account increased by7.5% in dollar terms from US$1036.7 million in 1990 to US$1114.5 million in 1991. The fall in both volume and price of some of the exports, as well increased imports, contributed to the increase in deficit (BOT report, 1991).



1.2.3 Trade balance and exchange rate for the period 2001 to 2010

In this period exchange rate depreciated continuously year after year (figure 1.7) below, but still yet imports were greater than export. We have again given reasons for the situations for some years. The whole decade Tanzania suffered trade deficit as shown (Anders D, 1994).

Figure 1.7: Exchange rate.



During 2006, Tanzania continued to record good overall macroeconomic reforms over the last decade. The economy was growing at average rate of 6.3% in the past five years to 2006. However the growth rate of GDP in 2006 was 6.2% slightly lower than the 5

years average. The slowdown economic activity in 2006 was on account of persistent drought which adversely affected agricultural product (BOT report, 2006).

During the year ending June 2010 the value of goods export increased by 14.9% to USD 3754.2 million from the level recorded June 2009. Largely due to an increase in export value of non-traditional commodities particularly gold, fish and fish products. The value of gold went up due to both price and volume factors. The value of goods import increased to USD 6570.3 million in that year ending June 2010 compared to USD 6220.5 million recorded during the year ending June 2009, largely due to a rise in imports value of oil, industrial raw materials, food and other consumer goods (BOT report, 2010).

1.3 Statement of the Problem

The trade balance in the economy helps to determine the macroeconomic performance of the economy like the balance of payment, investments and savings in both the developed and the developing economies. Tanzania is a developing country that has experienced trade deficit in different periods of time. However, the deficit in the trade balance has continued to increase crisis in Tanzania from 1978 due to the war in Uganda and when President Nyerere vetoed an IMF agreement including 15% devaluation in 1978-79.

On the other hand, the exchange rate plays a major role to improve the level of the trade balance because the economic theory stipulates that, the depreciation of the exchange rate improves the level of trade balance in the long-run even though it may reduce the trade balance in the short-run (Chiu et al. 2010). Besides, Tanzania has adopted both fixed exchange rate and flexible exchange rate regimes; of which during the flexible exchange rate regime, there was increased deficit in the trade balance as compared to

the fixed exchange rate regime. Therefore, these trends between the trade balance and the real exchange rate contradict theoretical economic view that currency depreciation improves the trade balance. As a result, the continued deficit in trade balance and the exchange rate depreciation in Tanzania may erode the country's competitiveness. Also, the consideration of other variables like broad money supply and the foreign and domestic income would help to give more information on the increasing deficit on trade balance. Therefore, there is need to understand the relationship and effects of the exchange rate on the trade balance in Tanzania from 1970 to 2014.

1.4 Objective of the study

1.4.1 General objective

The main objective of this study is to examine the effects of exchange rate on Trade balance in Tanzania.

1.4.2 Specific objectives of the study

i. To identify the relationship of the real exchange rate and other factors on the trade balance in Tanzania.
ii. To examine significant exchange rate policy which have influence on trade deficit lies in Tanzania trade balance.
iii. To analyses determinants of exchange rate variability in Tanzania from 1970 to 2014.

1.5 Hypotheses of the Study

The current study is bound to test the following hypotheses

a) Real exchange rate has a positive relationship with other factors on trade balance
b) Exchange rate policy has a influence on trade deficits on Tanzania trade balance
c) Trade policy reforms positively affect the trade balance in Tanzania from 1970-2014

1.6 Significant of the Study

The significant of this research is to provide a better knowledge and understanding the that affect trade balance and also identify in which point Tanzania is not doing better so that more effort and new measures can be taken to increase economic growth which will come by exporting more and importing less hence reduce the range deficit on trade balance on Tanzania Economy.

1.7 Scope of the Study

The research limits itself to the trade balance on exchange rate in Tanzania. Basing on the period of study of about ten years 1970 -2014. The choice of this period has been done according to the availability of the data for most of the variables that will be used in the research. It should be noted that most of the review from the previous researchers that conducted the similar study analyzed mostly the variables like the real exchange rate.

1.8 Limitations of the Study

The limitation of this analysis was based on Tanzanian's trade balance as the dependent variables and the real exchange rate as the main explanatory variable under consideration. Other dependent variables include domestic and foreign income, Gross Terms of trade, inflation and foreign direct investment.

Also the study obtained data from Ministry of Finance (MOF), Tanzania and Bank of Tanzania (BOT) Zanzibar branch. The research explored the effect of exchange rate on trade balance in Tanzania and used the data from 1970 to 2014. During this period there was a high deficit balance of trade contributed in the economic performance of Tanzania. However, due to the difficulty of the availability of data of GDP for foreign countries as individual, which could be available on government sectors such as Finance and Economy, education, health, agriculture and infrastructures it is difficult to measure the contribution of exchange rate on the economic growth of Tanzania. Another limitation was a lack of time and unavailability of sufficient funds to perform the study at a very significant depth. Also most of the top managements are scared to provide the data, taking to granted that these data are very confidential and it is for the government purposes only.

CHAPTER TWO

LITERATURE REVIEW

2.1 Chapter Overview

This chapter discusses the theoretical literature review that is related to the relationship of exchange rate and trade balance. It indicates definition of keys concept, Theoretical framework, further the empirical literature that shows the previous studies and their findings on the effects /relationships of exchange rate and other variables on trade balance. In an overview of the theoretical approaches, the elasticity approach aims to test the Marshall-Lerner condition; the monetary approach considers the excess demand and the excess supply of money as having an effect on the trade balance; the J-curve approach shows that devaluation deteriorates trade balance in the short run but in the long run trade balance improvement is supposed to hold. Besides, the two country imperfect substitute model stipulates direct linkage/effects and relationship of exchange rate on trade balance besides considering other factors.

2.2 Definitions of Key Concepts

2.2.1 Exchange Rate

Exchange rate refers the price at which one currency is exchanged for another currency, or price of a country's currency expressed in terms of another country's currency for instance the value of 1USD in Tanzania shilling is about Tzs1895 on May 10.2015 Krugman & Obstfeld, (2009). Therefore, it is conventional to define the exchange rate as the price of one unit of the foreign currency in terms of the domestic currency.

2.2.2 Trade Balance (TB)

Trade balance is the difference in monetary value between exports and imports. This was measured in terms of the US dollars against other currency like Tshs, Ellias (2001). The difference between a country's imports and its exports. Balance of trade is the

largest component of a country's balance of payments. Debit items include imports, foreign aid, domestic spending abroad and domestic investments abroad. Credit items include exports, foreign spending in the domestic economy and foreign investments in the domestic economy. A country has a trade deficit if it imports more than it exports; the opposite scenario is a trade surplus, Accessed on Investopedia on October, (2015).

2.2.3 Domestic Income (Y)

This is the total value of goods and services produced domestically within a period of time. It was measured by the annual real gross domestic product Mussa etal,(2000). GDP has a significant positive impact on volume of exports Kumar (1998), thus export growth in developing countries and confirmed that GDP has a significant positive impact on volume of exports.

2.2.4 Foreign Income (Y*)

It is the total aggregate value of goods and services produced by trade partners within a period of time. It was measured by the production index of countries that are the major trading partners with Tanzania. These countries included the USA, United Kingdom, the Netherlands, Germany, United Arab Emirates, Pakistan, Egypt, Uganda and Kenya. The total income of these countries is approximated in the US dollars Krugman (2009).

2.2.5 Exchange Rate Regime

An **exchange-rate regime** is the way an authority manages its currency in relation to other currencies and the foreign exchange market. It is closely related to monetary policy and the two are generally dependent on many of the same factors.

The basic types are a floating exchange rate, where the market dictates movements in the exchange rate; a pegged float, where a central bank keeps the rate from deviating too far from a target band or value; and a fixed exchange rate, which ties the currency to

another currency, mostly more widespread currencies such as the U.S. dollar or the euro or a basket of currencies Edwards, Sebastian & Levy Y, (2003).

2.3 The Concept of Balance of Trade

Various scholars have given different conceptual meanings to the balance of trade. The dictionary of economics and commerce defines balance of trade as "the relationship between a country's payments from imports of goods and its receipts from the export of goods. In other words, the items contained in a country's balance of payment include the total exports and imports of goods and services. Balance of trade is one the various items recorded in the current account section of balance of payments. It records a surplus when merchandise exports exceed merchandise imports and a deficit when merchandise imports exceed merchandise exports. In order words, it is the difference between merchandise export and import. Evaluation the concept of trade, Husted et al, (1992) have noted its importance and indicated that balance of trade is often used to justify a need to protect the domestic market from foreign competition.

2.3.1 Trade Balance and Exchange Rate for the Period 2011 to 2015

During the year 2011, Tanzania export continued decline that it amounted trade USD 6.95 million, the exchange rise from previous year to weighted average rate Tzs/US$ 1,595.38 on June 2011 recorded, but on December exchange rate weighted average rate (WAR), Tzs/US$1582.48 BOT, (2011).

During 2012, on June and December, the export continued to fall, that on June 2012 amount trade 4.50 million dollar as well at December was 4.15 million dollar, as the results leads to fall on the exchange rate at weighted average(WAR) Tzs/$1,577.61 on June and Tzs/$1,579.98 on December.

During the year 2013 and 2014, the export was slightly improve from 11.15 million dollar to decline on December 2014 to 7.40 million dollar, while exchange rate on its weighted average rate rise from Tzs/$1,610.43 on June 2013 to Tzs/$1,731.82 on December 2014 and Tzs/$ 1,959.89 on May 2015 BOT, (2015).

2.3.2 Tanzania Import, Export and Trade Balance with the Rest of the World.

In 2011 Tanzanian recorded a trade balanced deficit amounted USD-4,532.6 million compared to that recorded in 2010 which amounted to USD-2,647.9 million World development indicator 1(2010). The expansion of the deficit was mainly caused by the increase in the value of goods imports, compared to the value of exports domestic income, foreign income, foreign direct investment and money supply but this study try to cover that gap by exploring other variables that only few literature review were available and the fact that they might have an impact for the Tanzanian economy for example in this study the human capital development, natural resources availability has been included into the analysis that most other researchers did not include in their analysis on the same subject especially in Tanzania when analyzing trade balance hence we expects to add contribution to the existing literature. The inclusion of these two variables from the theoretical point of view seems to be very important especially in the developing countries in Africa where we see natural resources endowments and education plays a very big role, Moses S & Yao S (2013).

2.3.3 The Crisis period 1979 to 1985

The “Crisis” period began in 1979 with a major increase in the fiscal deficit associated with the war in Uganda. During this period the control regime was tightened even more as the government sought to finance the increased spending and to maintain the import-intensive BIS in the face of declining export proceeds. External arrears developed

rapidly and after the end of the Uganda war foreign inflows fell dramatically as the government clashed with the donors over macroeconomic policy. The dialogue with the IMF broke down in 1978-79, when President Nyerere vetoed an IMF agreement including a15% devaluation. The government implemented its own "National Economic Survival Programs" in 1981-82, but reforms were limited and unsuccessful.

Bevan et.al. (1990) provide and extensive analysis of macroeconomic development during the crisis period. A Commodity import Support scheme was introduced in the late 1970s to increase imports of particularly intermediate goods needed to increase capacity utilization. It was replaced by the open General license system in the early 1980s, but this had to be suspended already in 1982 due to lack of funds of agricultural marketing Donors who had been attracted by the egalitarian principles set out in the Arusha Decrelation, had become more and more critical about the negative effects of Ujamaa on economic efficiency, and by 1983 most of the donors had begun to withdraw their support of the Tanzanian experiment and aid flows declined.

Exports performance had deteriorated during the period as domestic inflation increased and the government had compressed imports through direct foreign exchange rationing rather than accommodating inflation through nominal depreciation. The government began to reverse its producer pricing policies in an attempt at export promotion in the early 1980s, but this was more than offset by increases in marketing in efficiencies and overvaluation. In 1984 the Government finally made its first major move towards liberalization, adopting an own-funds scheme that allowed importers to obtain licenses without declaring the source of their funds. But Tanzania resisted the pressure to devalue. It was President Nyerere's resignation opened the way for a more liberal policy including devaluation and import liberalization.

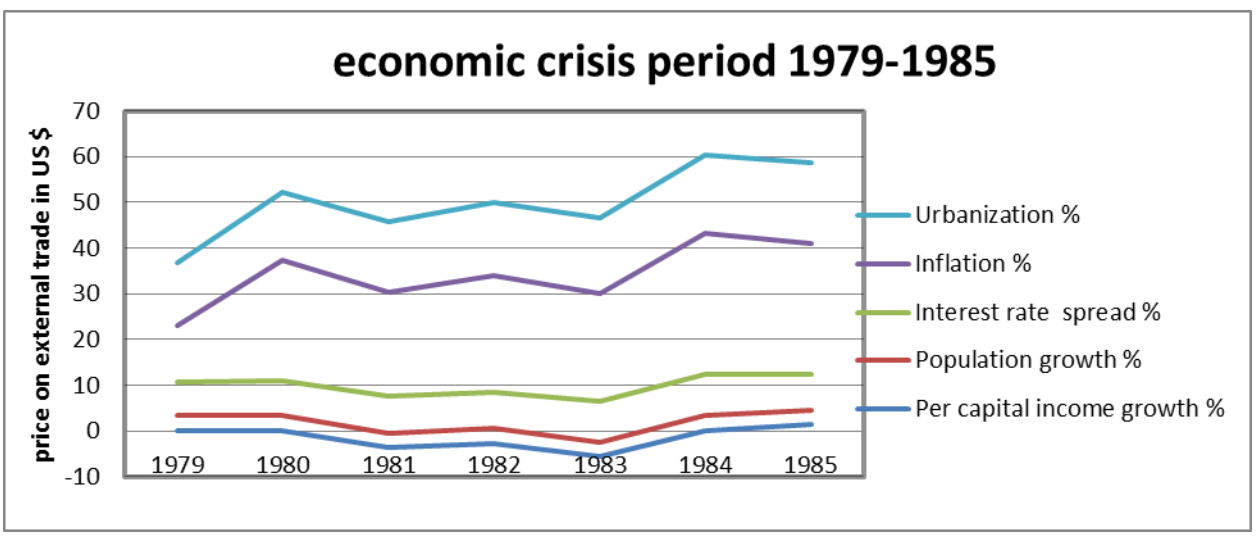
Export data for the crisis period must be interpreted with care, since the black market premium on foreign exchange was high and provided strong incentives for smuggling, Kaufmann and O'Connell, (1991). The decline in official exports during the crisis period therefore in part reflects a diversion of exports from official to unofficial channels in response to an increasing parallel premium (it increased from 45 percent at the end of 1978 to over 800 percent at the end of 1985). Some estimates put the level of smuggled export at about 50% of official exports Adam et al, (1994,).

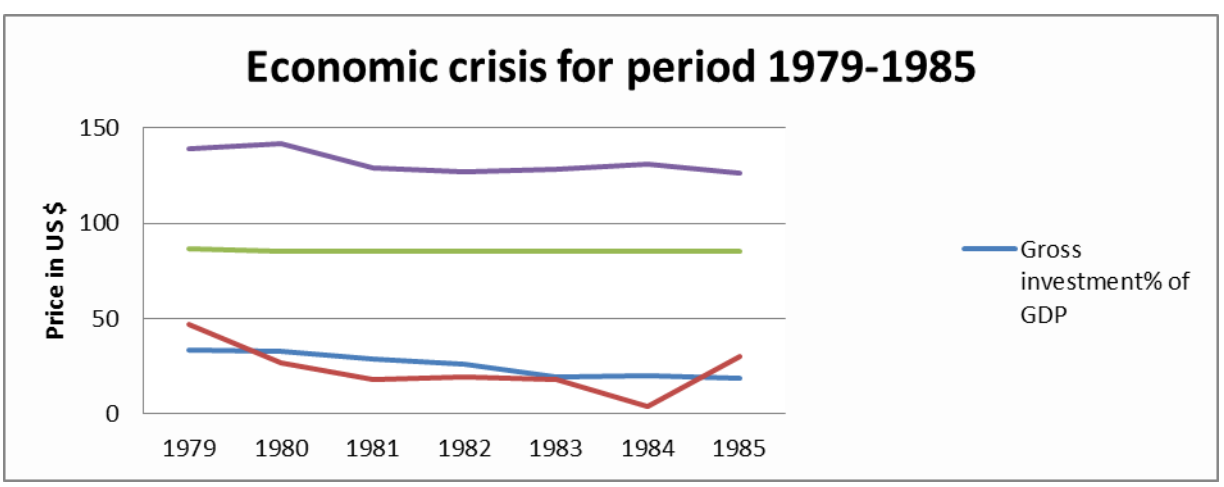
During the crisis period per capital income fell by 1.5% per year according to official estimates (see figure 1.8) but the estimates are particularly uncertain for this period because the price system was in disarray and much of economic activities had moved to the parallel economy. Estimates by Bevan et al (1988), based on household budget surveys using black market prices for goods traded in the parallel market, suggest more significant income declines. Manufacturing output collapsed due to lack of imports and agricultural growth declined. Public administration was still growing, although the growth rate had declined to less than four percent. State control of the "commanding heights" of the economy was a central tenet of the Arusha Declaration, and by the late 1970s Tanzania had constructed a very comprehensive parastatal sector (Bagachwa, Mbelle and van Arkadie, 1992). From roughly 40 entities in 1996, the parastastal sector grew to Encompass about 450 entities by the mid- 1980s, covering the entire range of economic activities.

The crisis period was characterized by hard internal political debates (for an extended discussion), see Bigsten, Mutalemwa, Tsikata, Wangwe, 1999). The political resistance to reforms was strong, since the liberation of the economy really represented a U-turn relative to the development strategy that was outlined in the Arusha Declaration. By the

mid-19980s, however, the crisis was so acute and the external support so small that the government had to budget. Still, a large group within the ruling party saw the shift to reform as a temporary setback, which mean

Figure 1.8: Economic crisis for period 1979-198





2.3.4 Exchange rate variations and balance of trade

Exchange rate variations are the frequent changes in exchange rate in the foreign market

According to Hyman (1996) exchange rate variation involves currency appreciation and depreciation. He goes further to explain that exchange rate appreciation occurs "when there is an increase in the number of unit of one's nation's currency that must be given up to purchase each unit of another nation currency" Thus a currency like Naira is said to have appreciated when there is an increase in the amount required to purchase a unit of dollars. In order words, it occurs, when there is low supply of a currency in relation to the demand for it.

Hyman Minsky (1982) also indicates that exchange rate depreciation occurs "when there is a decrease in the number of unit of one's nation's currency that must be given up to purchase each unit of another currency". It shows that depreciation makes the supply of a currency large in relation to the demand of it. The effect of exchange rate variations (depreciation or appreciation) on balances of trade, though the Husted et al, (1993).

Hyman (1996) also noted that when the shillings appreciate, other things being equal, domestic goods and services become more expensive in terms of dollar. This trends to decrease the foreign demand for Tanzania goods and services and to decrease the net exports.(deficit in balance of trade)

Similarly, when the shilling depreciates, domestic goods and services becomes cheap in terms of dollar, this will lead to increase in foreign demand of Tanzania goods and services to increase the balance of trade surpluses as exports grows more than import. According to Obaseki,(1993),there are various measures of the exchange rate derived from the elasticity, portfolio balances, purchasing power parity and monetary approaches to exchanges rate determination.

2.3.5 Devaluation and Balance of Trade

Devaluation is defined by Anyanwu, (1995) as reducing the value of a currency in terms of other currencies. It is different from depreciation which is the reduction in the value of a currency, which occurs when the supply for a country's currency is large in relation to the demand. Anyanwu, (1995) indicates that several factors like poor performance of direct foreign investment, speculative activities and sharp practices of authorized dealers in the foreign exchange market and problem of fragile export base has caused the countries depreciation of the shilling. Unlike depreciation, devaluation requires a deliberate action on the part of monetary authorities, Anyanwu,(1993). The purpose of devaluation is to stimulate exports and to discourage imports. According to husted et al (1993), devaluation is normally a response to a persistent growing balance of trade deficits. Explaining this, husted et al noted that if the prices of imports rises, fewer import will be demanded. At the same time, the lower price of domestic exports to foreigners will increase the demand for exports. With the combination of a higher demand domestic export and lower demand for domestic imports will bring about an improvement in balance of trade.

2.3.6 Determination of exchange rate

Three approaches are often used in determination of exchange rate. They are the traditional flows, the portfolio balance and monetary modes. The traditional flow views exchange rates as the product of the interaction between the demands for supply of foreign exchange. The portfolio balance model views exchange rate as the result of the substitution between money and financial assets. The major limitations of the traditional flow and portfolio balance models include the over-shooting of the exchange rate target and the substitutability between money and financial assets may not be automatic. This led to the development of the monetary approach. The monetary approach is predicated

on the importance of money. It identifies exchange rate a function of relative shift in money stock, inflation rate as proxy and domestic output between an economy and a trading partner economy. It is important to know that the purchasing power parity (PPP), is a major component of the monetary approach. The (PPP) between two currencies as provide by Gustav casel is defined as the amount of purchasing power. The (PPP) is long-term approach used in the determination of equilibrium exchange rate. It is often applied as a proxy for the monetary model in exchange rate analysis (CBN, 1998).

In the free market, the exchange rate is determined by the demand for the supply of foreign exchange. But the equilibrium exchange rate is the at which the demand for exchange rate equal to supply of exchange. Generally, there are two conventional methods used in the determination of the equilibrium exchange rate. To put in another ways, it is the rate which clears the market for foreign exchange. Generally, there are two conventional methods used in the determination of the equilibrium exchange rate. The rate of exchange between dollars and pound can be determinates either by the demand or supply of dollars, Here, the price of the Dollars is pound, or by the demand and supply of pounds while the price of pounds is Dollars.

It is important to known that demand for foreign exchange is a derived demand for dollars. It arises from the importation of American goods and services into Tanzania and from capital movement from Tanzania to the United States. Actually the demand for dollars implies a supply by American goods and services and makes capital transfers to the United States.

2.2.5 Causes of Changes in the Exchanges Rate

As earlier mentioned, the exchange rate between countries changes as a result of changes in demand or supply in the foreign exchange market. According to Jhigan (2000), the factors which causes change in the demand and supply of exchange rate are change in prices, changes in exports and imports movement, influence of banks ,influence of speculation, social change influence and political conditions. Are discussed below,

Changes in prices; Changes in Export and Influence of speculation; Stock exchange influence; Structure influences; Political Conditions: Jhigan (2000).

2.3 Theoretical Approaches

The relationship of exchange rate and trade balance is explained by various theoretical approaches like the elasticity approach, absorption approach, monetary approach and the two country imperfect substitute model approach.

3.2.1 The Elasticity Approach

The elasticity approach is also called the Bickerdike-Robinson-Metzler model (BRM) approach to trade balance. The The approach is based on the effects brought about by consumption and production and the substitution effect that is as a result of the adjustment in exchange rate. The model is a partial equilib-rium of the two countries and the two goods model and it assumes the exist-ence of perfect competition in the foreign market in the analysis of the effect of exchange rate adjustments on trade balance (Shao 2009). The elasticity ap-proach is analyzed by the separation of the markets for imports and exports; besides considering the income of both the foreign and domestic economy (Shao 2009). However, in this model, the real exchange rate is measured by the terms of trade and also domestic and foreign price are assumed to be constant or are exogenously determined. Consequently, the devaluation is expected to

increase the volume of home country's exports and lower the imports by the home country hence improve on trade balance (Jha 2003).

3.2.2 The Marshall-Lerner Condition

The Marshall-Lerner Condition states that, "devaluation of a currency will improve a country's trade balance in the long-run if the sum of absolute values of imports and exports demand price elasticities exceeds unity" (Mahmud et al. 2004**: 231).** could improve the trade balance. However, exchange rate is prone to external shocks and may fail to be stable. Therefore, this study does not focus on the Marshall-Lerner condition as it focuses on the relationship between exchange rate and trade balance by adopting linear model. Also, imports and exports are not considered separate in the analysis

3.2.4 The Monetary Approach

The monetary approach explains trade balance by looking at the supply and demand of money, where the supply of money is managed by the government through the central bank. If there is more domestic demand of money more than what the central bank is able to supply, then there would be need for the money from the foreign countries to fill the gap of the excess demand and as a result, trade balance may be favourable (Duasa 2007: 23). On the contrary, in the situation of having more money supply in the domestic economy by the monetary authority than is demanded, then there would be excess money sup-ply and this may result to outflow of money outside the economy and hence there may be decline in trade balance. Therefore, this approach considers excess money demand and money supply as having an effect on the trade balance. In this study, money supply is used to establish how this relates to trade balance in Kenya (Republic of Kenya 2014). There has been increase in money supply in the country and from the analysis in this model, the increase in money supply has negative effect on

trade balance and this for improved trade balance there needs to be low supply of money.

3.2.5 The J-Curve Approach

The J-Curve effect to trade balance stipulates that a country's trade balance measured in home currency units may be expected to deteriorate in the short run after the depreciation of the home currency and then in the long run, trade balance may improve (Isard 1995: 95, Jha 2003). The theory assumes that in the short run, import prices in the home currency would rise more rapidly than the export prices, whereas trade volume would only respond with a time lag which makes J-curve approach different from other approaches. This is be-cause, when the currency is devalued, imports tend to be expensive assuming that imports and exports change immediately hence leading to a negative effect on the trade balance. After a short while, the volume of exports may begin to rise because of their lower competitive prices in the foreign market and the local consumers purchase less imports. Consequently, the trade balance improves as the devaluation occurs. Also, the foreign consumers may opt to buy the goods that are exported to their home country as they become cheaper in the foreign currency as compared to their domestically produced goods (Hack-er and Hatemi 2004). However, devaluation may lead to low investment hence reduced economic growth (Weeks 2001: 65). Therefore, this study may analyze if the J-curve exists in the Kenya economy though it is not the main focus in the study.

3.2.6 The Two Country Imperfect Substitute Model

The two country imperfect substitute model of Rose and Yellen (1989) is an-other approach to trade balance. This approach shows the nature of the relationship of real exchange rate on trade balance in both short and long run. It stipulates that depreciation

of the real exchange rate improves trade balance. Besides, the model assumes that there are no perfect substitutes in the imports and exports for the locally produced goods and services (Rose and Yellen 1989). The model assumes also the following; first, price elasticity's of demand and the domestic and foreign income elasticity's are positive. Secondly, the income in the foreign or importing country may influence the level of exports by the domestic economy besides the price of domestic substitutes and the price of the imported goods. Moreover, there is need to prevent money illusion by considering that demand function is homogenous. The model is expressed as the partial reduced form of the domestic trade balance which is a function of the real exchange rate, domestic and foreign income. The reduced form equation was derived from the incorporation of the relative price of imports which was a function of real foreign price, real income and the real exchange rate. By the adoption of this model by Rose and Yellen (1989), it was concluded that foreign income and the real exchange rate have positive effects on trade balance while on the other hand the domestic income has negative effect on trade balance. The advantages of this model are that a single equation is adopted in the analysis process. Also, there is no need of the structural parameters and as a result it is likely to give the desired or undesired relationship /effect of the real exchange rate on the trade balance (Rose 1991). However, the model incorporates variables from other approaches and hence is not 'stand-alone' model. These variables as outlined are RER, domestic income and foreign income. Other variables may also be included in the model. The model may also adopt the analysis of the Marshall-Lerner condition but this is not the aim of this study

2.4. Empirical Literature Review

The empirical literature review in this study focuses on the empirical studies undertaken to establish the relationship of the exchange rate on trade balance. Various studies have been undertaken and established different results and these are explained as follows;

Shahbaz et al. (2010) carried out a study with the aim of establishing changes in the real exchange rate and the respective effect on trade balance (measured in terms of trade) in Pakistan. The study made use of the quarterly data from 1980 to the end of 2006 with only real exchange rate3 being dependent variable and by using the autoregressive distributed lag (ARDL) technique; the long run relationship was established to exist between real exchange rate and the trade balance. The study made use of the J-Curve approach to trade balance. The VECM was carried out and the impulse response function was also used to check on the existence of J-curve, which failed to exist according to the study. The effect was negative and significant and hence currency devaluation was noted to unfavorably affect trade balance.

Hynes and stone (1989) who estimated the impact of terms of trade on the US trade balance and their results showed no improvement in the trade balance following a deterioration of the terms of trade for the period between 1947 and 1974. The findings above is the same to the study of Bahmani Oskooee and Zohre (2006) who tested the phenomenon by employing co-integration and error correction modeling between the US and her trading partners. They showed that while in the short run the trade balance does not necessarily improves but in the long run it improves.

Bahamani Oskooee and Zohre (2006) refocused research in the US on the industrial level and estimated its corresponding import and export functions. They employed an autoregressive Distributed lag approach to co-integration analysis developed by

Pesaran, Shin and Smith. Their results show that in half of the 66 estimated export functions for US industries, coefficient on exchange rate is as expected significantly negative, however in the case of import functions only in 13 out of 66 cases estimated coefficients on exchange rate have the correct positive sign. Thus this study shows that if aggregated data are used, significant exchange rate coefficients in some sector could be offset by insignificant ones in other sector and could lead to the wrong conclusion that exchange rate has no impact on trade flows.

Bahmani Oskooe and Kutan (2007) while applying ARDL co-integration approach and corresponding LCM. They found empirical support for the effect of Exchange rate on Trade Balance pattern in three countries Bulgaria, Croatia and Russia. The study employs the Johansen co integration and error correction model on the annual data in the period 1970-2003 in general; the findings confirm the existence of the short run, dynamic and long run causal relationships between trade balance and the set of specified independent variables.

Stucka (2004) showed the existence of the effect of Exchange rate on Trade Balance in Croatia. The ARDL co-integration approach is used employing quarterly data. The obtained long run co-integrating relations show that one percent depreciation improves trade balance on average by 0.9% to 1.3%.

Concluding the research in the decade of 1990-2000 Gupta Kapoor and Ramakrishnan (1999) using quarterly data of Indian Trade with her Trading Partner from 1975 through 1996 and employing the Johansen procedure, found a long run (ie co-integrating) relation between trade balance, exchange rate and foreign and domestic GDP showing that depreciation leads to trade balance improvement.

Wilson and Takacs (2001) examined the relationship between the real trade balance and the real exchange rate for bilateral merchandise trade between Singapore, Korea and Malaysia with respect to the United States and Japan. No evidence of the effect of Exchange rate on Trade Balance was found, with the exception of Korea trade with the United States,

Research done for emerging economics covers Thailand Emerging Europe and in Africa Madagascar and Mauritius by Bahmani O and Tatchawan (2001) found in case of evidence of the effect of exchange rate on bilateral trade with US and Japan only. They used quarterly data from 1973 to 1997 and Autoregressive Distributed lag.

Recently an upsurge of research has occurred relating to less developed countries, predominantly emerging Asian markets, bahmani O and Tatchwan (2001) employs an unrestricted VAR model for the bilateral trade balances of Thailand and Malaysia with the United States and Japan for the period 1980 to 1996. He finds support for a stable and positive long run relationship between trade balance and the exchange rate no evidence of this effect was found in Malaysia data.

Upadhyaya and Dhakal (1997) test the effectiveness of devaluation on the trade balance for eight countries from both third world Latin America and African developing countries and In the first decade of new Millennium a study by Yol and Baharumshah (2005) Using annual data over period 1977-2002 from ten sub-Saharan African countries and Johansen and panel co-integration tests show that real exchange rate depreciation improves the trade balance in six of ten countries in contrast to Tanzania in which it worsens the trade balance, with no effect found in Ghana, Morocco and Senegal

2.5 Research gap

Given the review of the literature above, some research gaps are identified. One of the limitations is the issue of methodologies employed in the studies. In most cases, the methodologies employed were OLS, 2SLS or 3SLS. These approaches have their own weaknesses especially when the data used are time series are non-stationary. It appears that no study on Tanzania on more or less similar study has employed the Regression Model with a period of 44 years whose data are differentiated and becoming stationary whose advantages we discuss in the empirical model. Some of the studies however, are cross country and therefore their results may not reflect the true picture for individual countries. It is with picture in mind that the current study is envisaged to fill the gap by employing the Regression Model on trade balance for a developing country, like Tanzania**.**

2.6 Conceptual framework

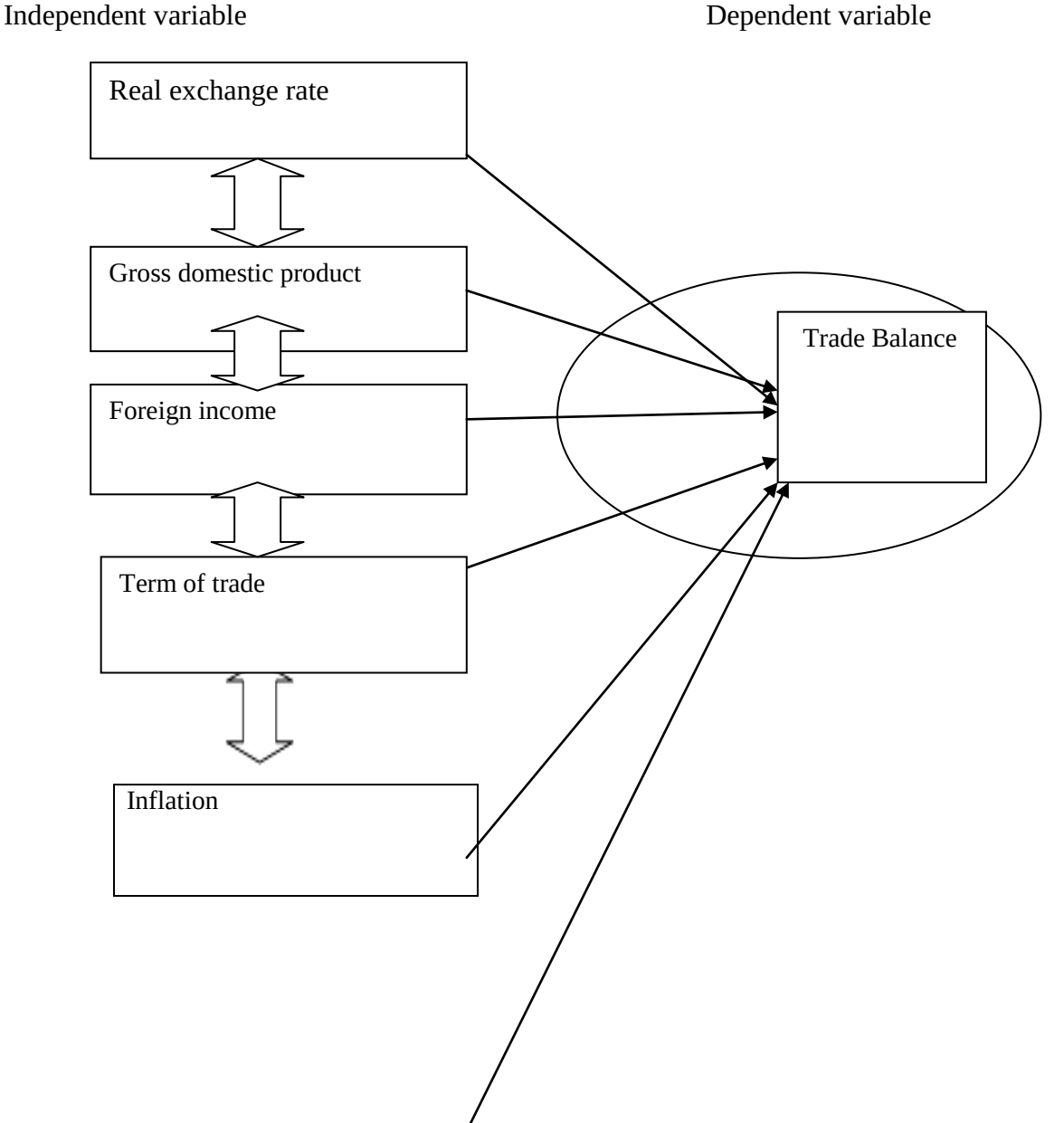
The study considers the real exchange rate basing in the two countries, which are Tanzania and the USA which had the available data on exchange rate since independence and also the US dollar is the major unit of transaction in the international market. Therefore, the study adopted two country imperfect substitute model of Rose and Yellen (1989) to establish the relationship of the real exchange rate and trade balance. Also, the approach models trade balance as a function of the real exchange rate, domestic income and foreign income. Therefore, the model shows that a depreciation of the exchange rate may lead to improvement in the trade balance. The model also postulates that the volume of exports to a foreign country is likely to rise as the real income and the purchasing power of the-se trading partners rises. The empirical model is stipulated in the reduced equation as below;

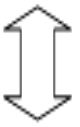
$TB= f (RER, Y, Y^*)$

$$\frac{dTB}{dy} =< 0, \frac{dTB}{dy} > 0 and \frac{dTB}{dRE} > 0 \text{.....(1)}$$

Where, TB is trade balances, RER is the real exchange rate, Y is the domestic income and foreign income.

Figure 1.9: Conceptual Framework





Foreign Direct investment

Source: Researcher computation, 2015

2.6.1 Brief Explanation of Variables

2.6.1 Real Exchange Rate (REX)

REX the rise of domestic price (Devaluation/depreciation) means import (IM) will becomes more expensive than Export (EX) so with devaluation we expect to have a positive sign: [1] noted that in an effort to gain international competitiveness and help to improve its trade balance, a country may let its currency to devaluate or allow her currency to depreciate. On the contrary the decrease of real exchange rate (evaluation/appreciation) may lead to the deterioration of balance of trade in this case the negative sign is expected Kim (1990), McNown & Wallace (1994).

2.6.2 Domestic income

Gross Domestic Product (GDP**)** is the broadest quantitative measure of a nation's total economic activity or refers to revenue derived from the internal sources of the country Krungman (2009). More specifically, GDP represents the monetary value of all goods and services produced within a nation's geographic borders over a specified period of time.

2.6.3 World real Income/ Foreign income (WY)

As the world income increase then more is expected to be imported from Tanzania hence this will improve the trade balance of the country. Therefore it is expected to have a positive sign. For the purpose of this study the Real GDP of the major importing

country is used as a proxy for foreign income and for simplicity reason, USA is selected to represent the income from the rest of the world (foreign income) in order to make it easy to identify the main variables that have an influence for the context Tanzania mainland as a whole. The reason for selecting USA is the close bilateral trade relationship that existed between the USA market and Tanzania for a long time and this is due the fact that USA is the destination for Tanzania primary products (imports) and Tanzania is also the main destination for USA manufactured goods Ellias (2001).

2.6.4 Foreign Direct Investment (FDI)

Foreign direct investment assist in improving trade balance especially if the multinational company motives is for export in this case we expect the positive sign however as noted by other researchers that it is possible FDI to have a negative impact on trade balance as it may be accompanied by the higher importation of the intermediate goods and the fact that FDI take sometimes to be realized however in this study we hypothesize a positive sign Dooley & Isard (1980).

2.6.5 Inflation (INF)

When inflation is low, it implies that the economy is in the “lose money cycle" and when inflation is high, it means that the economy is in "tight money cycle". In theory, when the economy is in the "lose money cycles" usually there is a higher trade deficit due to the monetary policy of allowing more credit with lower interest rates. As the rates increase, the money will get tighter and fewer will be willing to lend

the money as ownership becomes more attractive. This will trickle into the creating lower costs of production (labor, environment, and other production factors) there-by leading to the improvement of trade balance positively Krugman (2009).

2.6.6 Terms of Trade and Trade Performance

Terms of Trade are also one of the determinants of Trade performance in both developed and developing countries. Favorable terms of trade are associated with increased export growth rates and unfavorable terms with low export growth rate. Therefore when the value of a country's exports relative to that of its imports decreases, it means more money is used to buy imports than incoming one. In other word there is an unfavorable term of trade, and when the situation is opposite there is favor arable terms of trade. In this case terms of trade is expected to have a great influence on export performance Kumar (1998).

2.7 Summary of the Literature Review under Empirical Studies

It had been observed that some of the reviewed empirical studies, despite of using different approaches the results converge while some of them contradict each other. For instance most of the findings support the notion that FDI has a positive influence on Trade performance. However Menji (2010) and Agasha (2006) found no support for this contention.

Similarly, Sharma (2001), Lipumba and Ndulu (1990) found a positive significant relationship between real exchange rate and export performance. On the other hand Kasekende and Atingi - Ego (1999), Jorgen and Michael (2008) and Sarun (2006) their studies had found a negative relationship between real exchange rate and Trade performance. Hence the findings are inconsistence.

So far all reviewed empirical studies agree that Terms of trade and GDP were both found to have a positive influence to Trade performance whereas inflation rate had a negative impact to export performance.

As it has been noted earlier some of these findings seems to be similar although each of them used its own statistical research methodology. Some previous studies e.g (Amelia

and Santos (2000); Kumar (1998) and Gylfason (1997) applied cross country regression analysis methodology. However, cross country studies have heterogeneous results which lack generality. They fail to explain the reasons for a number of exceptional cases such as the relationship between exogenous and endogenous variables to that particular country. These can be well explained using country specific studies because in this case features of each specific country can be correlated to the results of analysis. This study intends to close methodological gap evident in previous studies.

However the previous studies investigated the determinants of export performance in general and have not particularly investigated the same on the sector. This study uses a different approach by disaggregating the sector into traditional and nontraditional

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Chapter overview

This chapter presents the research design, the theoretical framework and the empirical model. It also presents the data and the data source, and measurements of variables, testing procedures and the data analysis.

3.2 Research Design

The study made use of the quantitative research design because of the quantifiable and the numerical data that is produced in the process. This research dealt with the manipulation of the empirical variables from time series data for the period 1970 to 2014. This period ranges from independence time in Tanzania with various government policies and reforms. These include trade reforms, exchange rate policies and other

global reforms like the liberalization of the economy and the Structural Adjustment Policies (SAPs).

3.2.1 Data and Data Source

The data used is this study is the time series data on annual basis from 1970 to 2014. The data on the money supply, domestic and foreign income, Inflation, Terms of trade, and Foreign direct investment. Tanzania Economic Survey (2008), National Bureau of Statistics (NBS), IMF and World Bank websites. Data collected cover the period of forty four years (1970-2014) for the variation of exogenous and endogenous variables. In order to get a good result from the regressed time series econometric model the number of observations matters a lot. The higher the number of observation the better the result obtained. In view of this and from the fact that sources of data in Tanzania**,** in the current study multiple data sources of various types including time series and some indices were used. It is expected that the data was obtained from the National Bureau of Statistics (NBS), Ministry of Finance (MOF), The Bank of Tanzania (BOT), External Debt Department and the International Monetary Fund (IMF) Financial Statistics. It is also possible that some data will be drawn from the World Bank (World Development Indicators) and the Pennsylvania World Tables (PWT).

3.3 Model specification

The model is specified as indicated below to show the long run relationship of equation (1) with the incorporation of other control variables. The analysis of data was to examine the relationships between Trade balance (dependent variable) and real exchange rate, GDP, domestic income and world real income (which are repressor). The study follows Shao (2008), Herve et al (2009) and Bhattarai and Armah (2005) by estimating a single equation model treating real exchange rate, GDP (domestic real

income) and real world income as independent variables and Trade balance as dependent variable. The model is modified to include dummies in order to account for structural changes such as major policy changes trade liberalization which led to a shift to more flexible exchange rates from 1986 onwards. Therefore the model is expressed as indicated in equation 2;

$$TB = \beta_0+\beta_1 RER+\beta_2 TGDP + \beta_3 WGDP + \beta_4 FDI + \beta_4 TT+ \beta_5 Inf + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where ε represents error term which is independently distributed random variable with mean zero and constant variance. RER represents real exchange rate, TGDP represents the Tanzania GDP (domestic income), WGDP represents real word income, TT- Terms of trade, INF- Inflation, FDI- Foreign direct investment, with the value of 1 from 1975 onwards and 0 otherwise. TB represents the dependent variable (Trade balance). β_0, $\beta 1$, β_2, β_3 and β_5 are parameters to be estimated.

3.4 Estimation Technique

The specification of the functional relationship in equation (2) was estimated using the annual time series data for the period of 1970. The regression analysis was done and different statistical tests undertaken. The multivariate Co-integrated Vector Auto Regression (CVAR) was adopted to establish the long run relationship between trade balance and the respective variables, but having special consideration of the real exchange rate on the trade balance. The co-integrated vector auto regression was preferred because it shows the long run relationship among variables besides establishing the long run and short run effects through the vector error correction model (Gujarati 2003). The presence of co-integration implies the presence the long run relationship in the series (Gujarati 2003, Wooldridge 2003). Therefore, the co-integration was established and the parsimonious model by use of Vector Error

Correction Model (VECM) was carried out to establish the short run relationship. Besides, the impulse-response function and the variance decomposition technique were adopted to examine the long-run relationship and the short-run adjustment. However, the co-integration analysis requires that the data of each variable is examined of the integration order by stationary test because the variables are co-integrated if there is same order of integration among variables otherwise the relationship may be meaningless (Shao 2009). Therefore, there is need to first carry out the test described below;

3.4.1 Unit Root Testing

The time series data usually exhibit a non-stationary process and if Ordinary Least Squares (OLS) is applied directly, it gives spurious results, which arise with the regression of the non-stationary series that are unrelated hence indicating that the series are correlated (Wooldridge 2003, Favero 2001). The test for stationarity was carried out using both the Augmented Dickey-Fuller (ADF) tests and the Phillip-Perron (PP) test and these two tests are asymptotically the same (Gujarati 2003). A stationary series is a time series which has no unit root and the joint density function does not depend on time (Favero 2001: 35). Hence, if the series is integrated of or-der zero, I (0), estimation may not bring problems and no differencing is required. However, non-stationary series needs to be made stationary by differencing before estimation. A series is integrated of order (d) i.e. if after differencing d times; it becomes stationary (Engle and Granger 1987). The-se tests of stationarity involved the test of a null hypothesis of non-stationary against alternative of stationarity on models depicting random walk, random walk with a drift or random walk with a drift and a trend. The ADF unlike the Dicky Fuller (DF) unit root test considers autocorrelation of the error term (Gujarati 2003). According to Favero (2001), the DF and the ADF has been of significant success in

analyzing empirical studies in time series and the auxiliary regression is given as shown in equation 3;

$$X_t = \mu + yt + \delta x_{t-1} + \sum_{t=0}^{k} + \phi_t \Delta x_t + \in_t \quad \text{.....(3)}$$

Assuming no autocorrelation of the error term biases, the tests and hence its control ensures that the error term is a white noise (Wooldridge 2003). These tests are essential also as they may reduce the policy implication di-lemma.

3.4.2 Co-integration Analysis

Co-integration means that despite the data being non-stationary at levels in each variable, a linear combination of two or more time series can be stationary and this means that there exist a long-run equilibrium relationship among them (Gujarati 2003). The null hypothesis is that the series is not co-integrated against the alternative hypothesis that the series is co-integrated. If the series is co-integrated, modeling of the long-run relationship among variables is necessary. In such a case, the VECM is applied to reconcile the static long-run equilibrium relationship of co-integration with its dynamic short-run equilibrium in time series (Maddala and In-Moo Kim 1998).

To test for co-integration among variables, two approaches are applied; the Engel and Granger (1987) and the Johansen (1988) and Johansen and Juselius (1990). The Engel and Granger (1987) approach applies single-equation estimates of the equilibrium errors which appear to be stationary while the Johansen (1988) and Johansen and Juselius (1990) approach analyses multivariate co-integrated system based on the VAR approach. The latter defines maximum likelihood estimation to establish the rank of the co-integrating vector and it is considered superior to Engel and Granger (1987) approach (Shao 2009: 19-20). Also, the approach assumes that the error terms are independent and normally distributed (Maddala and In-Moo Kim 1998: 173) and hence

this approach is very sensitive to the normality of errors. The normality test was undertaken to check on this assumption. Therefore, the Johansen approach is adopted in this study.

Therefore, the Johansen test of co-integration formulates the VAR system, with a vector of *p* variables and is generated by the k-order vector autoregressive process with Gaussian errors:

$$Z_t = A_t Z_{t-1} + A_k Z_{t-k} + \mu + + \in_t, t = 1,2.....T, \quad (4)$$

Where

Z_t is a p× vector of the I(1) variables , A_k are the coefficients estimates , μ is the constant vector , ε is assumed to be *iid N(0,)*

And *k* is the order to be established in the model .The method was also adopted by Boug and Fagereng (2010) in Norway.

3.5 Time Series Characteristics of the Data

3.5.1 Vector Error Correction Model (VECM)

The VECM is adopted in the VAR analysis if there exists co-integration in the series. The VECM is determined by differencing the series and is given by;

$$\Delta Z_t = \Gamma r_1 Z_{t-1} + ... + \Gamma_{k-1} \Delta_{t-k+1} + \Pi Z_{t-k} + \mu + + \in_t, t = 1,2.....T, \quad (5)$$

The rank of the coefficient matrix establishes the level of the co-integrating vectors of. On the other hand, =αβ' where α and β rep-resents $p \times r$ matrices and $0<r<p$ and r represents linearly independent co-integrating vector (Shao 2009). Consequently, the trace statistics and the maximum eigenvalue tests help in determining the number of co-integrating vectors (Shao 2009). The VECM not only helps in establishing the short run adjustment, but also it helps in establishing impulse-response functions (IRFs) and carry

out variance decomposition, which gives more information among the endogenous variables.

3.5.2 Granger Causality Analysis and Tests

One useful application of the **Error! Objects cannot be created from editing field codes.**statistic in time series forecasting is to test whether the lags of one of the included regressors has useful predictive content, above and beyond the other regressors in the model. The claim that a variable has no predictive content corresponds to null hypothesis that the coefficients on all lags of that variable are zero. The **Error! Objects cannot be created from editing field codes.**statistic testing this null hypothesis is called the Granger causality statistic, and the associated test is called a Granger causality test (Granger, 1969; Stock & Watson, 2007). I will also perform Granger causality tests to ascertain whether lagged values of one variable predict changes in another, or whether one variable in the system explains the time path of the other variables. The test for Granger causality will be performed by estimating equations of the following form:

Error! Objects cannot be created from editing field codes., …… (6)

Error! Objects cannot be created from editing field codes., …….. (7)

Where,

Error! Objects cannot be created from editing field codes. and **Error! Objects cannot be created from editing field codes.** are white noise disturbance terms (normally and independently distributed), *m* are the number of lags necessary to induce white noise in the residuals, and **Error! Objects cannot be created from editing field**

codes. is the error correction term from the long run relationship. **Error! Objects cannot be created from editing field codes.** is said to Granger-cause **Error! Objects cannot be created from editing field codes.** if one or more **Error! Objects cannot be created from editing field codes. Error! Objects cannot be created from editing field codes.** and **Error! Objects cannot be created from editing field codes.** are statistically different from zero. Similarly, **Error! Objects cannot be created from editing field codes.** is said to Granger-cause **Error! Objects cannot be created from editing field codes.** if one or more **Error! Objects cannot be created from editing field codes. Error! Objects cannot be created from editing field codes.** and **Error! Objects cannot be created from editing field codes.** are statistically different from zero. A feedback or bi-directional Causality is said to exist if at least **Error! Objects cannot be created from editing field codes.** and **Error! Objects cannot be created from editing field codes. Error! Objects cannot be created from editing field codes.** or **Error! Objects cannot be created from editing field codes.**and **Error! Objects cannot be created from editing field codes.** are statistically different from zero. If on the other hand **Error! Objects cannot be created from editing field codes.** or **Error! Objects cannot be created from editing field codes.** are statistically significant, then we have an instantaneous Causality between **Error! Objects cannot be created from editing field codes.** and**Error! Objects cannot be created from editing field codes.**. To test for Causality use is made of either the significance of the t-statistic of the lagged error correction term or the significance of **Error! Objects cannot be created from editing field codes.**statistic of the sum of the lags on each right hand side variable. I will test for causality by modifying Equations 6 and 7 to obtain the following Equations:

Error! Objects cannot be created from editing field codes. ……. (8)

Error! Objects cannot be created from editing field codes. …… (9)

3.5.3 Regression Analysis

The regression analysis results was evaluated on the basis of adjusted coefficient of determination for degrees of freedom and for significance; conclusions will be made on the basis of **Error! Objects cannot be created from editing field codes.**statistics and **Error! Objects cannot be created from editing field codes.**values for each variable, while the **Error! Objects cannot be created from editing field codes.**ratio will be used to test the overall significance of the models. In addition, all coefficients signs will be examined for causality and their direction thereon, after which policy implications will be drawn. From the equation two we take Logs on both sides we obtained the log-linear transformation equation which will now estimate the α`s as elasticity's.

$$\mathrm{I}nTB_t = \alpha_0 + \alpha_1 \mathrm{I}nRER_{t-1} + \alpha_2 \mathrm{I}nGDP_{t-1} + \alpha_3 \mathrm{I}nFI_{t-1} + \alpha_4 \mathrm{I}nFDI_{t-1} + \alpha_5 \mathrm{I}nTT_{t-1} + \alpha_6 \mathrm{I}nINF_{t-1} + \Phi_t \text{.....(10)}$$

Wherein represents the natural log operation and Ø is assumed to be a Gaussian white noise. According to economic theory, a positive relationship exists between real foreign incomes and trade balances, and therefore $\boldsymbol{\alpha_1}$ is expected to be positive. Also, real exchange rate depreciation implies an increase in country competitiveness in the world market making export cheaper to foreigners, hence increasing demand for domestic exports and improving Trade balance. Therefore, $\boldsymbol{\alpha_3}$ is expected to be positive. Nevertheless $\boldsymbol{\alpha_4}$ and $\boldsymbol{\alpha_5}$ are expected to be positive

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.1 Descriptive and Summary Statistics

These descriptive statistics comprise of the mean, standard deviation, number of observations, minimum and maximum values for the variables under considerations in this study.

Table 1: Description and Summary Statistics of the Variables

Variable	No of OB	Mean	Median	SD	Min	Max
TB	51	-1.06e+09	-3.65e+08	1.79e+09	-7.44e+9	2.89e+08
RER	51	20.9028	2.117	29.5758	0.3564	106.58
GDP	51	4.7445	4.3006	4.35402	-4.6555	22.17
FY	51	9.53e+12	5.25e+12	7.59e+12	7.21e+11	2.43e+13
FDI	51	32.5667	30.9819	9.97102	4.2893	51.54
DERR	51	0.6274	1	0.4882	0	1

Source: Author, computed by stata based on the data from the World Bank (2014).

4.2 Estimation Results unit root test and Discussions

It is pertinent to find out if the relationship between economic variables is meaningful. This study therefore employs the Augmented Dickey- Fuller test to find out whether the variables in the regression model are stationary or not. Stationary of variables in a regression model is important for derivation of meaningful economic relationships between variables. Due to logarithmic to be applied into regression model, some data were containing negative sign which difficult to find the result by ADF test, hence we differentiating the variable, some we differentiating the variable into first order and others into second order and the results of test becoming as

Table 2: Results for Augmented Dickey –Fuller Test

Test Root at their neutrality

	lag	t-ad	t-prob	A	F-pr
Foreign Direct Investment	1	-2.476*	0.00	4.262	0.0000
Inflation	1	-2.144*	0.00	-2.401	-0.0000
Gross Domestic Product	0	9.505	0.00	-5.625	0.0000
Exchange rate	0	6.422	0.00	3.069	0.000
Exports	0	-0.1205	0.00	7.009	0.0000
Terms of trade	0	0.7375	0.00	-0.2753	0.000
Traditional Trade	0	0.05487	0.0405	2.928	0.000
Nontraditional Trade	2	4.976	0.0021	2.726	0.0041
Test Root at their natural logarithms					
LnForeign Direct Investment	0	-2.441	0.001	-2.933	0
Ln Inflation	0	-1.147	0.020	-4.543	0
Ln Gross Domestic Product	0	1.140	0.000	-7.298	0
Ln Exchange rate	0	-6.461**	0.002	-7.600	0
Ln Terms of trade	1		-3.974**	-7.494	0
Ln Trade balance	1		-3.125*	-4.813	0
Ln Traditional trade bal	0	-0.6767	0.0405	--4.750	0
Ln Nontraditional exports	0		-0.2242	-5.012	0

	Test Root at first Difference			
	Lag	t-ad	t-prob	A
F-prob				
dForeign Direct Investment	1	-13.73**	3.869	0.0044
dInflation	1	-8.836**	0.00	-3.308	0.0005
dGross Domestic Product	1	-4.776**	0.00	-6.934	0.0069
dExchange rate	1	-7.925**	0.00	1.259	0.0000
dTerms of trade	1	-9.995**	0.00	-2.231	0.0010
dTrade balance	1	-7.994**	0.00	-4.354	0.0003
dTraditional trade	1	-4.018**	0.00	1.239	0.0000
dNonTraditional Trade	1	-13.58**	0.00	2.855	0.0006

Note: * significant at 1 %, ** significant at 5%, *** significant at 10%

Table 2.0 shows the results of unit root test. The result shows that exchange rate, foreign direct investment, inflation and nontraditional Trade balance became stationary at zero lag, first lag and second lag respectively. Interms of Akaike information Criteria AIC these variables were not at their lowest levels. On the other hand gross domestic product, terms of trade, total Trade balance, traditional trade and nontraditional trade

were not stationery. This is normally done to provide a general picture, on how the data behaves before being transformed into natural logarithms.

At their natural logarithms exchange rate, terms of trade and total Trade were significant and became stationary at zero and first lag respectively. All other variables were not stationary and their AIC were not at their lowest levels. However the same data were tested at their first difference and the result indicated that all variables obtained a lower AIC at first lag and were also significant. From the above observation the best result has been obtained after the data have been tested at their first difference. The reason behind is, this result shows a consistency among all the variables by becoming stationary at their first lag and all being significant. Therefore, for the purpose avoiding spurious regression, the best results obtained from the ADF test were used to run the regression.

4.3 The VECM Modeling

From the objective 1, we want to test the granger causality of the exchange rate with other factors on the trade balance. The vector error correction model is based on one rank and one lag. But before the analysis of the VECM, there was need to carry out the Jarque-Bera which shows the normal distribution of the series. The results are shown in table 3

Table 3: Normality test of error terms

Jarque-Bera test			
Equation	LMstatistics	df	Prob.
D_TB	9.058	2	0.01079
D_RER	16.229	2	0.00030
D_DY	56.313	2	0.00000
D_FY	1.035	2	0.59601
D_MS	134.236	2	0.00000
D_ERRG	1843.553	2	0.00000
All	2060.424	2	0.00000

Source: Researcher

The study according to the results in table 3 fails to reject the null hypothesis that errors are normally distributed at 5 percent significance level. Therefore, the VECM results are presumed to be consistent in policy formulation and decision making. Therefore, VECM is modeled to find out the short-run relationship between variables. Since the result shows one co-integrating equation among these variables, the trade balance as the de-pendent variable was normalized to be 1 by stata in the co-integrating vector.

4.4 Co-integration analysis

From objective number three, the model list the co-integrated if is stationery from first order. In a regression involving non-stationary variables, spuriousness can only be avoided if a Stationary co-integrating relationship is established between the variables. Therefore, if two or more variables can be linked together to form an equilibrium relationship spanning the long run, then even though the variables themselves may contain stochastic trends, they will nevertheless move closer over time and the difference between them will be stable. Therefore a test for co-integration, need to be run and the ADF unit roots test to be used to test for the stationery of the residuals. If the residuals are stationary, then there is a proof for the presence of co-integration in the series used in the model (Adam 1993; Perman, 1989). The co-integration test results in Table 3 indicate the presence of long run equilibrium among the time series data. The implications of these results are that, even if individual variables are non-stationary, their linear combination may be stationary. The results obtained reject the null hypothesis of no co-integration among the variables at 1 percent level of significance. This implies that log of Total Trade balance, log Foreign Direct Investment, Log of Exchange Rate, log of Inflation Rate, Log of GDP, log of Terms of Trade log of Traditional trade and log of Non Traditional trade are co-integrated. So, we start from

test on order of integration. We use Kwiatkowski, Phillips, Schmidt, Shin test for stationary of a time series. The results of the test are presented below,

Table 4: Co-integration Test Results.

Lag order	0	1	2	3	4	5	7	8
Real exchange rate (base on CPI)	.473	.283	.221	.191	.174	.164	.159	.158
Real exchange rate (base on export and import deflators)	.444	.282	.225	.195	.177	.167	.162	.16
Domestic GDP	.0234	.0264	.0673	.167	.0856	.0712	.123	.207
Foreign GDP	.266	.175	.144	.131	.127	.127	.13	.134
Trade balance	.136	.0951	.0814	.0799	.0794	.083	.0898	.103
Critical values for Ho: variable is trend stationary 10%: 0.119 5% : 0.146 2.5%: 0.176 1% : 0.216								

Source: Author's own computation from collected data (2015).

Table 5. KPSS test results for first differences

Lag order	0	1	2	3	4	5	7	8
Real exchange rate (base on CPI)	.0721	.0732	.0878	.101	.0947	.0934	.103	.115
Real exchange rate (base on export and import deflators)	.0891	.0813	.0941	.115	.114	.117	.126	.144
Domestic GDP	.0228	.0265	.0706	.2	.0931	.0756	.135	.243
Foreign GDP	.0378	.0495	.0601	.077	.0902	.112	.147	.203
Trade balance	.0704	.086	.0925	.127	.113	.118	.12	.139
Critical values for Ho: variable is trend stationary 10%: 0.119 5% : 0.146 2.5%: 0.176 1% : 0.216								

Source: Author's own computation from collected data (2015).

So, the results suggest that the variables follow I(1) process as their first differences follow I(0) process. The result is expected as most of macroeconomic variables follow I(1) process. The next step is to test on order of integration. We first apply Johanson test to test for several co-integration relationships. We assume that in long-run trade balance is zero that is why we exclude constant from the test. We use Akaike's information criterion

(AIC), Schwarz's Bayesian information criterion (SBIC), and the Hannan and Quinn information criterion (HQIC) to test for lag-order in vector autoregression. The statistics suggest including 4 lags. Then we conducted test for the rank order of VEC. The test results are presented below. They imply that there is no co-integration between the variables.

Table 6: Test for number of co-integration relationships

Trend: none Sample: 5 - 24				Number of obs = 20 Lags = 4	
maximum rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	48	-741.52088	.	206.4430	39.89
1	55	-663.82982	0.99958	51.0609	24.31
2	60	-646.10428	0.83010	15.6098	12.53
3	63	-640.89774	0.40587	5.1968	3.84
4	64	-638.29935	0.22882		

Source: Author's own computation from collected data (2015).

So, we did not find co-integration between the variables. However, we can do the analysis at VAR model for first differenced variables. Firstly, we pre-test on the number of lags in the first difference model within the same statistics as before. The test results are unstable when we change maximal lag included. We also tried to estimate a model that include only two variables – exchange rate and trade balance – or include exchange rate and trade balance as exogenous and domestic and foreign GDP as exogenous factors. The statistics appeared to be unstable. Moreover, the size of our sample does not allow us to include high lag's orders or additional variables into the model. That is why we conclude that either we cannot estimate VAR model for the relationship or we need to extend the sample period.

4.5 The results of linear regression model

From the objective number 2, exchange rate policy will causes the effect on trade balance and their direction thereon, after which policy implications will be drawn.as table 7 indicated, the exchange rate policy has no significant to trade balance, while the GDP and foreign income has a significant sign on trade balance policy.

Table 7. Linear regression model results

Real trade balance	Model 1 *(RER base on CPI)*	Model 2 *(RER based on export and import deflators)*
Real exchange rate	-8814.147 (6628.521)	-1371.673 (3305.95)
Real domestic GDP	-56.84353 *** (9.14306)	-54.4026 *** (11.37982)
Real foreign GDP	17.6815** (5.802528)	11.74348* (6.040048)
Constant	3548334 (2644449)	481641.5 (1114737)
Adjusted R^2	0.7343	0.7133
Hausman test for significant of the difference between the two models	chi2(2) = 3.88 p-value = 0.1435	

***-significant at 1% level;**-significant at 5% level; *-significant at 10% level

The tests results suggest that the influence of real exchange rate during the sample period was not significant. However, the impact of domestic and foreign output is significant and has the expected sign. It may a signal of adequacy of the model. The check the adequacy we also made tests on heteroskedasticity, autocorrelation, normality and omitted variables. The results are presented below.

Table 8. The results of the tests on linear regression model

Statistics	Model 1	Model 2	Interpretation
Breusch-Pagan test for heteroskedasticity *Ho: Constant variance*	chi2(1) = 0.96 p-value = 0.3277	chi2(1) = 1.65 p-value = 0.1991	We cannot reject Ho, so the residuals are homoskedastic
Ramsey RESET test for omitted variables *Ho: no omitted variables*	F(3, 17) = 1.00 p-value = 0.4159	F(3, 17) = 0.42 p-value = 0.7382	We cannot reject Ho, so there is no omitted variables

Statistics	Model 1	Model 2	Interpretation
Skewness/Kurtosis tests for Normality *Ho: the residuals are normally distributed*	chi2(2) = 1.59 p-value = 0.4521	chi2(1) = 3.62 p-value = .1634	We cannot reject Ho, so the residuals are normally distributed
Durbin-Watson d-statistic *Critical values* d_L*=1.06* d_H*=1.76*	1.364439	1.494538	The values are in the area of uncertainty, so we cannot tell that the residuals are serial correlated

So, all the tests indicate that the model is adequate. However, it is not only real exchange rate that influences trade balance, but also the external trade creates demand and supply of currency and makes pressure on exchange rate. Moreover, trade balance is included into GDP. So, we may have endogeneity in the model. To test it we apply Hausman test and use lagged exchange rate and domestic GDP as instruments (table 9).

Table 9: Results of the tests on endogeneity

Tested variable	Model 1	Model 2
Real exchange rate	chi2(2) = 13.31 p-value = 0.0013	chi2(2) = 0.20 p-value = 0.090
Domestic GDP	chi2(2) = 7.67 p-value = 0.0216	chi2(1) = 4.35 p-value = 0.0370

The results suggest that in both models we have endogeneity bases. That is why we proceed with more complicated several equations models that allow us controlling for endogeneity.

4.6 : Overall Trade Balance

Table 7 shows that R^2= 73% of the variation in the Trade balance is explained by the following variables foreign income, inflation rate, gross domestic product, real exchange rate and terms of trade. The probability of F statistic is significant which implies that the model is well specified. There is no indication of serious autocorrelation problem basing on the information given by the Durbin- Watson (D-W) statistic of 1.78

which is close to conventional mark of 1.5 to 2.5. Furthermore the results show that Tanzania trade performance was found to be positively and significantly influenced by foreign direct investment, inflation rate, terms of trade and real exchange while gross domestic product was found to be insignificant. This also implies that a unit change increase in foreign income for the result into an increase of 0.7units of total exports for the current quarter.

Exchange rate of the previous quarter has a positive and significant impact to the total trade balance of the year. As indicated in table number 9 exchange rates for the 1st, 2nd and 3rd lags were all found statistically significant to total export performance. Also it has been found that total export decreases by 3.89 as a result of a unit change decrease in terms of trade TOT. The results for some of these variables were contrary to our expectation. For example, inflation rate having a positive coefficient sign that is having a positive relationship with Trade balance. Gross Domestic Product was found to be statistically significant Trade balance in Tanzania.

However, this result has found to be similar with that of Ngeno from Kenya, using trade growth as a function of output and real exchange rate. He found out that both output and real exchange rate are positively and significantly influence trade growth rate. Also Kumar (1998) conducted a study on the determinants of trade performance in developing countries and found out that GDP has positive relationship with trade volumes since increased production leads to surplus output in an open economy being exhausted on international market.

The results from the model reveal that Tanzania trade performance is significantly and positively affected by fluctuations in terms of trade. This implies that terms of trade was found to be statistically significant to trade balance in Tanzania meaning that Tanzania

trade more when there are favorable terms of trade and vice versa. This significant impact of terms of trade is quite similar to that of Agasha (2006) who found a positive impact of terms of trade on Uganda's trade growth rate. Again this result is as it was anticipated from the hypothesis formulated.

Terms of Trade at each particular lag interval significantly affects the current's quarter trade growth rate. This finding is consistent with that of Jayant Parimal's findings of Burundi. He discovered that deteriorating terms of trade leads to contraction of export earnings and instability. A number of other such studies suggest the same results. Musinguzi, et al. (2000), found out that Terms of trade has sigficant effect to export growth rate. Furthermore Kasekende and Anting-Ego while studying the impact of trade liberation key market of sub-Sahara Africa found out that export volume are significantly correlated with terms of trade.

According to the results the effect of real exchange rate on trade performance is positive and statistically significant. Again this finding has found to be consistency with other previous studies. For example, Sharma (2006) while investigating the determinants of trade balance in India discovered that a fall in domestic prices due to exchange rate depreciation makes trade cheaper in international markets resulting in their increase demand. Cline (2004) also conducted a similar study using pooled data of over hundred developing countries for the period of 1981-2001.He ran an Ordinary Least Squire regression and his results showed that Real exchange rate has significant effect that is its depreciation increases trade growth. On the other hand these findings were found to be inconsistency with that of Musinguzi, et al. (2000), who found out the real exchange, is statistically insignificant to export growth rate in Uganda.

Inflation rate has also been observed to be statistically significant to trade performance. This finding has found to be consistent with that of Gylfason (1998) studying the main determinants of trade and economic growth in cross-sectional data from the World Bank covering 160 countries in the period 1985-1994. He pointed out that excessive dependence on primary exports tends to be associated with low total trade and slow growth, The most likely explanation for this link is that an abundance of natural resources leads to the Dutch disease, involving overvaluation of the national currency and wage distortions, in addition to rent seeking, that is costly from a macroeconomic point of view. He concluded that high inflation and an abundance of natural resources tended to be associated with low exports and slow growth rate.

Foreign income was found significant to trade balance. This finding is as it was anticipated and is also similar with that of Amelia and Santos (2000) studied the effect of trade liberation on trade performance in selected developing countries and discovered that foreign income significantly affects trade volumes. Moreover, Hoekman and Djankov (19980 analyzed the magnitude of trade structure in Eastern European Countries and their result suggested that there is positive association between foreign income and trade structure.

Table 10: Regression Result of Total trade

Variables	Coefficient	Std.Error	t-value	t-prob	Part.R^2
Dtrade bal1	0.891942	0.1175	7.59	0.010	0.5455
Dtrade bal2	-0.699858	0.151	-4.64	0.002	0.3092
Dtrade bal3	0.370832	0.1264	2.93	0.005	0.152
Constant	1.81889	2.511	0.724	0.472	0.0108
Dfdi	0.817939	0.1095	7.47	0.00	0.5376
Dfdi_1	0.704229	0.2422	2.91	0.006	0.1497
Dfdi_2	0.315498	0.2576	1.22	0.227	0.0303
Dfdi_3	0.31256	0.1567	1.99	0.052	0.0765
Dinf	14.2489	4.288	3.32	0.002	0.187
Dinf_1	-2.28964	8.034	-0.285	0.777	0.0017
Dinf_2	-4.8985	8.148	-0.601	0.551	0.0075
Dinf_3	11.3869	4.523	2.52	0.015	0.1166
Dgdp	73.5132	37.51	1.96	0.056	0.0741
Dgdp_1	-88.1093	52.11	-1.69	0.097	0.0562

Dgdp_2	54.9109	51.49	1.07	0.292	0.0231
Dgdp_3	-1.81114	33.18	-0.0546	0.957	0.0001
Dexcrate	-2.28073	0.7409	-3.08	0.003	0.1649
Dexcrate_1	2.82716	1.043	2.71	0.009	0.1328
Dexcrate_2	-2.53163	1.009	-2.51	0.016	0.116
Dexcrate_3	1.40382	0.6136	2.29	0.027	0.0983
Dtot	2.40133	2.792	0.86	0.394	0.0152
Dtot_1	-8.4682	5.22	-1.62	0.111	0.052
Dtot_2	11.4981	5.201	2.21	0.032	0.0924
Dtot_3	-10.68	2.743	-3.89	0.0104	0.24
residtttrade	87.9448	14.2	6.19	0.01	0.4443
residtttrade1	-93.6051	13.52	-6.93	0.003	0.4998
sigma 5.04558 RSS 1221.97769 R^2 0.984789 F(26,48) = 119.5 [0.000]** log-likelihood -211.073 DW 1.78 no. of observations 75 no. of parameters 27 mean(Dtradebl) 2.4688 var(Dtradebl) 1071.15					

Source: researcher computation using Stata, (2015)

4.7 Comparison with other studies

Various studies have been done to investigate relationship between exchange rate and trade balance, from which different results have been obtained. The aims of investigation are see the way how exchange rate can be used as a tool to affect the trade balance in certain direction. However after a century of research in the field we still do not have a sharp theory about depreciation and appreciation on trade balance Qiao (2005). The empirical findings in this direction are also mixed Koray and McMillin (1998), the results showed exchange rate to be positively or negatively related to trade balance and in some cases, it was found to be insignificant. Here we provide few of them which resemble this study.

Miles (1979) examined the relationship between devaluation and Trade balance of payments during the 1960s for a group of 14 developed countries, the balance of payments improved after devaluation. There was no support for the hypothesis that devaluation improves the trade of balance. He concluded that the adjustment to devaluate is essentially monetary in nature involving only portfolio stock adjustments.

Brada et al (1993), examined the response of the trade balance of China to the real exchange rate using quarterly data for 1980:IV. Co-integration technique was applied in this study, he found that both in the short-run and long-run devaluation serves to improve the balance of trade, though showed the bulk of the response to devaluation occurs over one year period with no J-curve effect. Marwah and Klein (1996) find evidence of S-curve for both Canada and US utilizing disaggregated data in IV and OLS regression for the period 1977 to 1992, according to their results the trade balance initially declines after depreciation followed by trade balance improvement.

Wane (2000), on the study of real exchange rate and trade balance in Tanzania from 1967 to 1997 showed that exchange rate is positively related to trade balance and foreign balance is related to trade balance. This means that an increase in real prices of foreign exchange improves trade balance. Baharumshah (2001), employs an unrestricted VAR model for bilateral trade of Thailand and Malaysia with the US and Japan for period 1980 t0 1996 he finds support for a stable and positive long-run relationship between trade balance and exchange rate. Fisher and Huh (2001), studying Exchange rates, trade balances and nominal shocks in G-7 they found that a nominal shocks causes a real exchange to depreciate and the trade balance to improve in long run, which is Lane`s model when the income effect of a nominal shock dominates the substitution effect.

They further showed that a positive aggregate supply shock causes output to increase and real exchange rate to depreciate in each of the G-7 countries, both in short run and long run. Both effects where statistically significant tended to work in opposite directions on the trade balance over both the short and long run. Hacker and Hatermi (2002) looked at disaggregated bilateral data between the Czech Republic, Poland and

Hungary with respect to Germany. They found evidence of a positive long run relationship between the trade balance and the exchange rate for all three countries. The Czech Republic and Poland seem to possess characteristics that lead to the J-curve.

Table 11: Table of specific objective and results implication on the relationship of exchange rate on trade balance

Author and year	**Country**	**Theoretical approach**	**Method of analysis**	**Independent variable**	**Sign and Sig. (5 % level)**	**Remarks**
Duasa (2007)	Malaysia (study on determinant of trade balance)	Elasticity approach, absorption approach and monetary approach	Autoregressive distributed lag (ARDL) using annual time series data from 1974 to 2003.	Exchange rate	(+) Significant	Variance decomposition and IRF were used as further inferences; The study was to establish only the effects of the variables considered but not the relationship; Recommendation: absorption and monetary approaches were to be adopted In Malaysia.
Foreign direct investment				(+) Significant		
Guechari (2012)	Algeria and the world; Algeria with two trading partners (USA and France)	Two country imperfect substitute model of Rose and Yellen (1989)	Cointegration ; VECM and im-pulse response function using quarterly data 1981 to 2009	Real effective exchange rate	(+) significant in the long run (-) Significant in the short run	Real devaluation improved exports hence trade balance in Alge-ria; Granger causality showed that the real exchange rate granger caused trade balance; In Algeria, currency depreciation improves exports hence trade balance.
Domestic income				(-) Significant		
Foreign income				(+) Significant		

Kennedy (2013)	Kenya (study on determinant of trade balance)	Marshall-Lerner condition approach	Co-integration and VECM using annual data from 1963 to 2012	Exchange rate	(+) Significant	The study was to test the Marshall - Lerner condition in Kenya but not the relationship of the real exchange rate on trade balance; From the study, the Marshall-Lerner condition was established.
Foreign direct investment			(+) Significant			
Budget deficit			(+) Significant			
Onafowora (2003)	Malaysia, Indonesia and Thailand (with the bilateral trade with USA and Japan).	Two country imperfect substitute model of Rose and Yellen (1989)	Co-integration vector autore-gression and VECM using uarterly data from 1980 to 2001	Real exchange rate	(+) Significant	Long run relationship was established among the variables; **Findings**: Depreciation of the RER led to fall in the trade balance in the short run but improved it later in the long run hence J-Curve effect was established; The Marshall-Lerner condition was also
Domestic income			(+) Significant			
Foreign income			(-) Significant			
Dummy4 (D97)			significant			
Author and year	**Country**	**Theoretical approach**	**Method of analysis**	**Independent variable**	**Sign and Sign. (5 % level)**	**Remarks**
Petrović and Gligorić (2010)	Serbia	J-Curve ap-proach	ARDL and Johansen's method using Monthly data from January 2002 to September 2007	Real effective exchange rate	(+) significant	Impulse response were used also as a method of further inferences; Findings: the depreciation of the real exchange rate improved the trade balance.
GDP			(-) Significant			

Rose (1991)	5 OECD coun-tries – USA, Ja-pan, Germany, Canada and the United Kingdom	Two country imperfect substitute model of Rose and Yellen (1989)	OLS and other non-parametric method using monthly data for the period 1974 to 1986.	Real exchange rate, Money sup-ply (M1), Short term interest rate Foreign output Domestic output.	No long run relation-ship	The study established that there was no effect of the real ex-change rate on the trade balance and hence fluctuations of the RER had no significance.
Stučka (2004)	Croatia and the trading partners 5	Two country imperfect substitute model of Rose and Yellen (1989).	ARDL (IV) and Bewley methods using quarterly data from 1994 to 2002.	Real exchange rate	(+) Significant	The long run relationship was established the Marshall-Lerner condition which was the main aim. **Relevance:** Devaluation improves trade balance even though there may be increased debt servicing hence affecting the economy. It was observed that various methods give different results hence inconsistency in policy formulation.
Domestic income				(-)		
Foreign income				(+)		
Wilson and Tat (2001)	Singapore with USA as the trading partner	Reduce model of Rose and Yellen (1989)	ARDL technique Quarterly using data from 1970 to 1996	RER Domestic income Foreign income	Not significant	Findings: Little evidence of J-curve established. No long run relationship existed between the trade balance and the independent variables. Therefore, devaluation failed to improve trade balance.

Source: researcher 2015

4.8 Chapter Summary of the results

The first specific objective, it suggested that there was no significant relationship between real exchange rate and other factors on the trade balance during the sample period. The model did well on all of the tests except for the test on endogeneity of real exchange rate and domestic GDP. These variables appeared to be endogenous and due o that the model is said to have an endogeneity bias. To overcome this problem we introduced several equation models.

The second specific objective presented determination of real exchange rate variability in Tanzania from 1970 to 2014 on trade balance. The results of estimation showed that this was no significant connection between real exchange rate and trade balance. As it was mention the model presents only equilibrium dynamics. So, in order to model the adjustment processes a co-integration analysis. All variables appeared to follow I(1) process. However, we did not find any co-integration. Moreover the pre-estimation statistics for VAR model appeared to be unstable. Based on that and on the fact that vector auto regression models are hardly applicable to small sample we concluded that we cannot estimate a VAR model for the data.

The third specific objective test for significant of exchange rate policy which can influence on trade deficit lies in Tanzania trade balance, difference between the two models showed that the difference is not significant. This implies that the two proposed measures represent nearly the same dynamics in real effective exchange rate despite the fact that they have significant difference in values, at least for the purpose of our analysis.

Concluding, we could not find any significant relationship between exchange rate and trade balance in the data during the sample period. The possible explanations of the results are presented in the next section.

CHAPTER FIVE

CONCLUSION AND RECOMEDATIONS

5.1 Conclusion

This paper presents an analysis of relationship between real exchange rate and trade balance in Tanzania 1970-2014 years. The estimation reviled that there is not significant impact of exchange rate on trade balance during the period. The theoretical model presented in first part of the work describes the connection between the two variables. It suggests that exchange rate should have a positive impact on trade balance. The other two important factors are domestic and foreign outputs. The theory predicts that domestic output have negative impact on trade balance while foreign output affect trade balance positively. Moreover the analysis of the theory of exchange rate fundamental suggests that domestic and foreign interest rates are also very important for exchange rate determination. So, the answer to the first question asked in the work, what other important factor influence trade balance, is domestic and foreign output. But we also use other factors for the investigation of exchange rate behaviour.

There is a lot of work done on the research of relationship between exchange rate and trade balance for most of the countries. However, the finding does not give a clear answer whether and how exchange rate influence trade balance. Moreover, the studies cannot help to define what important factors determine the relationship. Even though we may conclude that developed countries' experience shows that the theoretical connection mostly correspond to empirical observations, we may explain it as endogeneity result (meaning that models were established in developed countries and in such a way to fit their practice).

As the relationship is hardly predictable in countries that did not research it field we decided to estimate the relationship. To complete that we need a measure for real effective

exchange rate. That is why we developed and presented in this paper a measure based on relative purchasing power parity. We did two measures for which we used Tanzanian CPI and average of export and import deflators as domestic price index. Foreign price index was proxies by average of CPI of main trade partners. The results of the estimation showed that the two measures both were nearly the same for the purpose of the research.

The estimators we obtained during the analysis imply that there is no significant connection between exchange rate and trade balance. We started our work from simple regression analysis. The results tell that the connection is very weak. However, for domestic and foreign GDP we obtained significant coefficients with expected signs. The model is appeared to have an endogeneity bias that is why we used simulation us equations. However, the SE model also showed that there is no significant relationship. The signs of all significant coefficients were in line with the theory. In this work we could not estimate a model that reflects short run dynamics due to absence of necessary data.

A possible explanation for our findings may be that price (exchange rate) is not the main factor of competitiveness in the foreign market for goods that has the major part in Tanzanian trade. Moreover, due to National Bank policies there is also no reverse impact. We also should mention that our research may have limited application for period of appreciation as the model was not tested for that case.

The suggestions that are made base on the finding are that the regulator cannot target trade balance using only exchange rate policy. If it wants to influence trade it should include other regulations. However, it does not imply that any shocks in exchange rate will not influence trade balance. The main issue here is the possibility to predict and credibility of policy maker. Huge shocks may have a negative effect on trade balance.

Further researches in this field may be dedicated to the estimation of short run dynamics of the connection, to investigations of common impact of exchange rate and other policy. Also the described models may be used in construction of a country model for Tanzania.

5.2 Policy recommendations

The policy implication is that Tanzania's trade deficit may be reduced by the depreciation of the real exchange rate in both short and long-run periods. Thus, the government needs to formulate policies that make the currency competitive in the international market to improve on exports. Also, formulation and implementation of such policies would improve the confidence of investors hence improve investment in the productive sectors. In addition, the government should improve exports of goods and services among the trading major trading partners and other countries by manufacturing high quality of goods that are competitive and satisfactorily fulfills the needs of the foreign economies.

Also, the Government needs to enhance import-substitution industries by improving infrastructural facilities, formulate good trading policies and ensure political stability that are essential in enhancing export oriented investment hence favorable trade balance. Also, there is need for the government to have better fiscal policies and monetary policies that targets improvement in the domestic income (economic growth) and export respectively that would significantly improve trade balance.

The study was limited by data availability and therefore for further research in this area, the study recommends that the weighted real exchange rate could be calculated by considering the major trading partners. Also, the data on the foreign income could be disaggregated and make analysis in consideration of every country. This would enhance the provision of more information on the relative importance of each of the trading

partner in the fluctuations of the real exchange rate and the trade balance among other factors.

5.3. Further research

The scope of this study covers about 44 years as sample period of study for Tanzania and used a Regression technique as an estimation method. In this case in order to ensure maximum exploration and exhaustion of the variables that can give the robust results further studies on the determinants of balance of trade is needed especially using other econometric measuring techniques with broader sample period of study and more variables to be included, for example this study has only used USA GDP as a proxy to represent the world income due to the difficulties to get data on other countries therefore the results in this study should be cautiously be interpreted.

However in regard with the above research result it is obvious that there are other possible factors contributing to the trade balance in Tanzania. Therefore, other variables to be considered for further research includes trade policy, fiscal policy, government consumption and foreign price. This study was only limited to the observation of a single direction between the dependent and independent variables. But for the case of future studies one could use Granger causality in order to oversee if there is a possibility of these variables to depend each other.

REFERENCES

Ahmed, A. and Messinis, G. (2011). The Role of Exports, FDI and Imports in Development: Evidence from Sub-Saharan African Countries', Applied Economics 43(26): 3719-3731.

Arize, A. C. (1994). 'Co-integration Test of a Long-Run Relation between the Real Effective Exchange Rate and the Trade Balance', *International Economic Journal* 8(3).

Agénor, P.-R, and Montiel, P. (1996). *Development Macroeconomics* Princeton, New Jersey: Princeton University Press.

Ajayi, S. (1995). Capital Flight and External Debt in Nigeria, AERC Research Paper No.35. Nairobi, AERC.

Ajayi, S. I. (2002), Macroeconomic Approach to External Debt, The Case of Nigeria AERC Research Paper No. 8. Nairobi, AERC.

Baharumshah, A. (2001). The Effect of Exchange Rate on Bilateral Trade Balance: New Evidence from Malaysia and Thailand', Asian Economic Journal 15(3): 291-312.

Bahmani-Oskooee, M. (2001). 'Nominal and Real Effective Exchange Rates of Middle Eastern Countries and their Trade Performance', Applied Economics 33(1).

Bahmani-Oskooee, M. (1992). 'What are the Long-Run Determinants of the US Trade Balance?' *Journal of Post Keynesian Economics*.

Bahmani-Oskooee, M. and Ratha, A. (2004). 'The J-Curve: A Literature Review', Applied Economics 36(13).

Boug, P. and A. Fagereng (2010). 'Exchange Rate Volatility and Export Performance: A Co-integrated VAR Approach', Applied Economics 42(7).

Boyd, D. (2001). 'Real Exchange Rate Effects on the Balance of Trade: Co-integration and the Marshall–Lerner Condition', *International Journal of Finance & Economics* 6(3).

Branson, W. H. (1986). 'Stabilization, Stagflation, and Investment Incentives: The Case of Kenya,

Battacharya, R. and Clements, B. (2005). *Calculating the Benefits of Debt Relief:* How Cutting External Debt Burden can Boost Growth in Low Income Countries.

Bigsten, A., and Mutalemwa, D. (1999),. Aid and Reforms in Tanzania. ESRF, Dar es Salaam.

Backus, D. (1986). "The Canadian – US Exchange Rate: Evidence from a Vector Autoregression", *Review of Economics and Statistics*, Vol. 68, No. 4,

Backus, D. (1994). "Dynamics and Trade Balance and Term of Trades: the J-Curve?" *American Economic Review*, Vol. 84, No. 1, pp.84-103

Bahmani, M. and Tatchawan, K. (2001). Bilateral J curve Between Thailand and Her *Trading Partners Journal of Economic Development* vol 13.

Bahmani, M. and Swarnjit, A. (2003). Bilateral J curve Between India and her Trading Partners. *Journal of Applied Economics, Volume* 35.

Bank of Tanzania, (2004). Economic Bulletin for the Quarter ended Vol. XXXV No 2.

Enders, E. (2004). Applied Econometric Time Series (2nd ed) New Jersey: John Wiley and Sons.

Goldstein, M. and Khan, M. (1985). Income and Price Effects of in Foreign Trade .Handbook of International Economics, Volume 2

Gupta, A. and Ramakrishnan, U. (1999). Is there a J curve ? *A new estimation for Japan International Economic Journal Vol* 13(4).

Haynes, S. and Stone, J. (1982). Impact of the terms of trade on the US trade Balance: a reexamination. Review of Economics and Statistics.

Hsing, H. (2005). Reexamination of J curve Effect for Japan, Korea and Taiwan. Japan and the world economy Volume 2 Issue 17.

International Monetary Fund (2008). World Economic Outlook, chapter 6 pp197240httpwww.imf.org/external/pubs/ft/weo/2008/02/pdf/c6.pdf.

Johansen, S. (1991). Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregression Models, Econometrica

Johansen, S. (1995). Likelihood Based Inference in Cointegrated Vector Autoregressive Models", Oxford, Oxford University Press.

Junz, H. and Rhomberg (1973). Price Competitiveness in Export Trade among Industrial Countries,Papers and Proceedings of American Economic Review Volume 63.

Kruger A (1983). Exchange rate determination, Cambridge: Cambridge University Press.

Krugman, P. (2006). International Economics Theory and Policy Seventh Edition, Princeton University, Pearson Addison Wesley.

Lipsey, R. and Chrystal, K. (1995). Introduction to Positive Economics, Oxford University, Oxford University Press.

Magee, S. (1973). Currency Contracts, Pass Through and Devaluation, Brooking Papers on Economic Activity Volume 1

Marwah, K. and Lawrence R. (1996). Estimation of J curves; United States and Canada." *The Canadian Journal of Economics, 29(3):* 523-539

McKenna, J. (1977). Aggregate Economic Analysis Fifth Edition, University of Missouri St Louis, The Dryden Press.

Metzler, L. (1948). The theory of International Trade, In Howards, SE (1984) ed 1 A Survey of Contemporary Economics, Philadelphia, Blakiston.

Miles, M. (1979). The Effects of Devaluation on the Trade Balance and the Balance of Payments: Some new results, *Journal of Political Economy*.

Narayan, P. and Narayan, S. (2004). The J curve: Evidence from Fiji, International Review of Applied Economics Volume 18 Issue No 3

Noland, M. (1989). Japanese Trade Elasticities and J curve, The review of Economics and Statistics.

Ogbona, B. (2009). Long run Exchange rate effects on Trade Balance, Evidence from *Nigeria, Journal of Research in National Development Volume 7 No 1*, June 2009.

Pesaran, H. (2001). " Bounds Testing Approaches to the Analysis of Level Relationship. " *Journal of Applied Econometrics* 16:289-326.

Rawlins, G. (2011). Currency Depreciation and the Trade Balance: The Case of SubSahara Africa, *Journal of Applied Business and Economics,Vol.12*, Issue.

Razafimahefa, I. and Shigeyuki, H. (2005). *Import Demand Function Some Evidence from Madagascar and Mauritius Journal of African Economies* 14(3):411-434

Rose, A. and Yellen, J. (1989). Is there a J curve? *Journal of Monetary Economics*,24:53-

Rose, K. (1990). Exchange rates and the trade balance: Some Evidenced Countries, Economic Letters, Volume 34,Issue 3,November 1990, Elsevier.

Salvatore, D. (1999). International Economics Sixth Edition, Fordham University, Prentice Hall.

Schiller, B. (2006). The macro Economy Today tenth edition, American University, McGRaw Hill Irwin.

Stucka, J. (2004). Effect of Exchange rate Changes on Trade Balance in Croatia, IMF Working Paper,WP/04/65.

Tihomir, S. (2003) The Impact of Exchange rate Changes on The Trade Balance in Croatia, Croatia National Bank Working Paper Series, No W 11,October 2003

Toda, H and Yamamoto T (1995). Statistical Inference in Vector Autoregressive with Possibly Integrated Processes, *Journal of Econometrics Trade Policy Review*.

Upadhyaya, K. and Dhakal, D. (1997). *Devaluation and Trade Balance*: Estimating the Long run Effect, Applied Economic Letters Vol 4.

Williamson, J. (1982). The exchange rate System Washington DC Institute for International Economics.

Wilson, J. and Takacs, W. (1980). Expectations and the Adjustment of trade Flows under Floating Exchange rates: Leads, Lags and the J curve. International Finance Discussion Paper.

Yol, M. and Baharumshah, A. (2005). T*he Effect of Exchange rate changes on trade balances in North Africa:* Evidence, International Trade and Finance Association 15th International Conference, Paper 46.

Yol, M. and Baharumshah, A. (2007). Estimating Exchange rate and Bilateral Trade Balance Relationships: The Experience of Sub Saharan African Countries, South *African Journal of Economics, Volume 75,* Issue**.**

APPENDICES

Appendix 1: Detail summary statistics on variables use in the work

Tanzanian import

Percentiles		Smallest		
1%	3546934	3546934		
5%	4102111	4102111		
10%	4395549	4395549	Obs	28
25%	6202806	4535307	Sum of Wgt.	28
50%	9260673		Mean	1.06e+07
		Largest	Std. Dev.	5883416
75%	1.37e+07	1.83e+07		
90%	1.88e+07	1.88e+07	Variance	3.46e+13
95%	2.36e+07	2.36e+07	Skewness	.9796345
99%	2.55e+07	2.55e+07	Kurtosis	3.172116

Tanzanian import price adjusted

Percentiles		Smallest		
1%	3546934	3546934		
5%	4090756	4090756		
10%	4281941	4281941	Obs	26
25%	5757920	4481725	Sum of Wgt.	26
50%	6522219		Mean	6452741
		Largest	Std. Dev.	1492498
75%	7273457	7749115		
90%	8213301	8213301	Variance	2.23e+12
95%	8907266	8907266	Skewness	.0206601
99%	9813836	9813836	Kurtosis	2.785286

Tanzanian export

Percentiles		Smallest		
1%	3873078	3873078		
5%	4256782	4256782		
10%	4627723	4627723	Obs	28
25%	6385263	4945953	Sum of Wgt.	28
50%	8473074		Mean	9379093
		Largest	Std. Dev.	4142122
75%	1.16e+07	1.36e+07		
90%	1.38e+07	1.38e+07	Variance	1.72e+13
95%	1.88e+07	1.88e+07	Skewness	1.053237
99%	2.10e+07	2.10e+07	Kurtosis	3.98127

Tanzanian export price adjusted

Percentiles		Smallest		
1%	3873078	3873078		
5%	4193104	4193104		
10%	4475649	4475649	Obs	26
25%	4677223	4479245	Sum of Wgt.	26

50%	5054282		Mean	4946447
		Largest	Std. Dev.	406002.8
75%	5235498	5334173		
90%	5427202	5427202	Variance	1.65e+11
95%	5471582	5471582	Skewness	-.8350098
99%	5509542	5509542	Kurtosis	3.214055

Tanzanian trade balance

	Percentiles	Smallest		
1%	-5015453	-5015453		
5%	-4829716	-4829716		
10%	-4729086	-4729086	Obs	28
25%	-2362163	-4437916	Sum of Wgt.	28
50%	-792149		Mean	-1205678
		Largest	Std. Dev.	1957691
75%	296707.3	739295		
90%	857204	857204	Variance	3.83e+12
95%	859413	859413	Skewness	-.7191525
99%	1553966	1553966	Kurtosis	2.321035

Tanzanian trade balance price adjusted

	Percentiles	Smallest		
1%	-4734693	-4734693		
5%	-3600324	-3600324		
10%	-3556206	-3556206	Obs	26
25%	-2459070	-2713590	Sum of Wgt.	26
50%	-1285297		Mean	-1506294
		Largest	Std. Dev.	1296883
75%	-716312	102348.8		
90%	193708.5	193708.5	Variance	1.68e+12
95%	278560	278560	Skewness	-.5551758
99%	326144	326144	Kurtosis	2.873452

Tanzanian GDP

	Percentiles	Smallest		
1%	44132	44132		
5%	50117	50117		
10%	52583	52583	Obs	28
25%	71396.5	60798	Sum of Wgt.	28
50%	104027.5		Mean	123812.5
		Largest	Std. Dev.	63599.63
75%	162098	212781		
90%	232470	232470	Variance	4.04e+09
95%	232483	232483	Skewness	.7722806
99%	278344	278344	Kurtosis	2.635652

Tanzanian GDP price adjusted

	Percentiles	Smallest

1%	44132	44132		
5%	50408.14	50408.14		
10%	50482.44	50482.44	Obs	28
25%	67803.5	57820.4	Sum of Wgt.	28
50%	84189.57		Mean	85324.23
		Largest	Std. Dev.	23917.07
75%	105476.5	114680.3		
90%	120745.9	120745.9	Variance	5.72e+08
95%	121217.8	121217.8	Skewness	.2046225
99%	136635.6	136635.6	Kurtosis	2.235272

World GDP (weighted average of GDP of main trade partners)

	Percentiles	Smallest		
1%	258141	258141		
5%	263629.1	263629.1		
10%	277219.9	277219.9	Obs	24
25%	302317.6	282125.3	Sum of Wgt.	24
50%	356336.6		Mean	388661
		Largest	Std. Dev.	102835.5
75%	486602.6	518659.2		
90%	543428.1	543428.1	Variance	1.06e+10
95%	546687.2	546687.2	Skewness	.4268405
99%	576430.3	576430.3	Kurtosis	1.740839

World GDP (weighted average of GDP of main trade partners) price adjusted

	Percentiles	Smallest		
1%	228804.3	228804.3		
5%	240722.6	240722.6		
10%	250190	250190	Obs	24
25%	261366.8	255672.7	Sum of Wgt.	24
50%	275815.9		Mean	291317.2
		Largest	Std. Dev.	39945.77
75%	329517.1	344883.8		
90%	350485.8	350485.8	Variance	1.60e+09
95%	353995.2	353995.2	Skewness	.3992479
99%	363917.5	363917.5	Kurtosis	1.850718

Average Tanzania interested rate weighted by instruments

	Percentiles	Smallest		
1%	7.833333	7.833333		
5%	7.9	7.9		
10%	8	8	Obs	28
25%	8.863333	8.066667	Sum of Wgt.	28
50%	10.86667		Mean	11.51262
		Largest	Std. Dev.	2.920107
75%	14.45	15.2		
90%	15.46667	15.46667	Variance	8.527023
95%	15.56667	15.56667	Skewness	.2592865
99%	16.9	16.9	Kurtosis	1.584827

3-month LIBOR rate

	Percentiles	Smallest		
1%	1.121	1.121		
5%	1.14	1.14		
10%	1.164333	1.164333	Obs	28
25%	1.660333	1.234	Sum of Wgt.	28
50%	2.856418		Mean	3.129848
		Largest	Std. Dev.	1.622917
75%	4.957067	5.3581		
90%	5.367167	5.367167	Variance	2.633859
95%	5.420933	5.420933	Skewness	.2485689
99%	5.446667	5.446667	Kurtosis	1.529765

Constructed export deflator

	Percentiles	Smallest		
1%	.987061	.987061		
5%	.9956205	.9956205		
10%	1.000677	1.000677	Obs	26
25%	1.015186	1.005233	Sum of Wgt.	26
50%	1.044847		Mean	1.053418
		Largest	Std. Dev.	.0573561
75%	1.057014	1.115721		
90%	1.118299	1.118299	Variance	.0032897
95%	1.155927	1.155927	Skewness	1.716643
99%	1.246825	1.246825	Kurtosis	6.182748

Constructed import deflator

	Percentiles	Smallest		
1%	.9657139	.9657139		
5%	.9710832	.9710832		
10%	.974046	.974046	Obs	26
25%	1.009911	.9961987	Sum of Wgt.	26
50%	1.017565		Mean	1.038353
		Largest	Std. Dev.	.0669628
75%	1.049467	1.094666		
90%	1.113013	1.113013	Variance	.004484
95%	1.135559	1.135559	Skewness	2.397224
99%	1.296846	1.296846	Kurtosis	9.676571

World CPI (weighted average of CPI of main trade partners)

	Percentiles	Smallest		
1%	1.00804	1.00804		
5%	1.008258	1.008258		
10%	1.00884	1.00884	Obs	26
25%	1.016501	1.009084	Sum of Wgt.	26
50%	1.021048		Mean	1.022887
		Largest	Std. Dev.	.0103381
75%	1.027267	1.036327		

90%	1.041123	1.041123	Variance	.0001069
95%	1.043285	1.043285	Skewness	.5923795
99%	1.04515	1.04515	Kurtosis	2.753828

Tanzanian CPI

	Percentiles	Smallest		
1%	.984996	.984996		
5%	.987909	.987909		
10%	.988889	.988889	Obs	28
25%	1.00751	.992761	Sum of Wgt.	28
50%	1.027628		Mean	1.027518
		Largest	Std. Dev.	.0270688
75%	1.045668	1.053868		
90%	1.063272	1.063272	Variance	.0007327
95%	1.073722	1.073722	Skewness	.4823292
99%	1.096941	1.096941	Kurtosis	2.967396

Nominal (official) exchange rate

	Percentiles	Smallest		
1%	484.6882	484.6882		
5%	496.2509	496.2509		
10%	505	505	Obs	28
25%	505	505	Sum of Wgt.	28
50%	519.89		Mean	521.008
		Largest	Std. Dev.	24.76903
75%	532.9783	533.1833		
90%	533.3433	533.3433	Variance	613.5046
95%	533.37	533.37	Skewness	2.254935
99%	620.9491	620.9491	Kurtosis	10.49509

Calculated real exchange rate (based on domestic CPI)

	Percentiles	Smallest		
1%	472.1653	472.1653		
5%	475.9911	475.9911		
10%	476.1148	476.1148	Obs	26
25%	491.7587	476.9166	Sum of Wgt.	26
50%	503.3566		Mean	515.908
		Largest	Std. Dev.	38.72655
75%	531.8633	548.5403		
90%	573.3463	573.3463	Variance	1499.746
95%	608.8777	608.8777	Skewness	1.427165
99%	626.4504	626.4504	Kurtosis	4.627861

Calculated real exchange rate (based on world CPI)

	Percentiles	Smallest		
1%	487.0764	487.0764		
5%	496.8704	496.8704		
10%	502.8557	502.8557	Obs	26
25%	523.1577	504.5598	Sum of Wgt.	26
50%	581.8411		Mean	611.4515
		Largest	Std. Dev.	111.9205
75%	668.1101	741.77		
90%	749.8015	749.8015	Variance	12526.2
95%	823.363	823.363	Skewness	1.068063
99%	920.4633	920.4633	Kurtosis	3.490913

Appendix 2: The differentiated data used in the study,

Year	tb1	rer2	gdp1	wgdp	Infl
1970				12.13	
1971	0.46		0.04	12.17	
1972	-0.19	0.00	0.07	12.25	0.03
1973	0.32	-0.02	0.03	12.32	0.03
1974	0.91	0.03	0.02	12.31	0.01
1975	0.16	0.02	0.06	12.34	0.15
1976	-0.74	0.10	0.82	12.38	-0.20
1977	0.20	-0.14	0.08	12.43	0.03
1978	1.07	-0.06	-0.01	12.48	0.02
1979	-0.12	0.14	0.01	12.53	0.00
1980	0.19	-0.06	0.00	12.62	0.15
1981	-0.10	0.01	-0.01	12.66	-0.04
1982	0.23	0.10	0.01	12.69	0.02
1983	-0.39	0.07	-0.02	12.72	-0.01
1984	0.09	0.13	0.03	12.72	0.07
1985	0.85	-0.18	0.04	12.83	-0.02
1986	0.56	0.49	0.01	12.86	-0.01
1987	0.78	0.05	3.76	12.90	-0.02
1988	0.24	-0.24	0.04	12.96	0.01
1989	0.56	-0.07	0.03	13.02	0.00
1990	0.75	-0.06	0.06	13.07	0.04
1991	0.17	-0.19	0.03	13.10	-0.05
1992	0.33	0.19	0.02	13.11	-0.05
1993	0.28	0.00	0.00	13.12	0.02
1994	0.14	-0.08	0.01	13.13	0.09
1995	-0.01	-0.11	0.04	13.15	-0.06
1996	-0.34	-0.11	0.04	13.18	-0.05
1997	-0.37	0.04	0.03	13.20	-0.04
1998	0.71	0.03	1.68	13.18	-0.03
1999	0.20	0.10	0.05	13.18	-0.04
2000	-0.18	-0.18	0.05	13.21	-0.02
2001	0.20	0.08	0.06	13.22	-0.01

2002	-0.19	0.02	0.07	13.22	0.00
2003	0.37	-0.04	0.07	13.24	0.00
2004	0.39	-0.02	0.08	13.27	-0.01
2005	0.31	-0.01	0.07	13.30	0.00
2006	0.50	0.07	0.07	13.32	0.02
2007	0.29	-0.11	0.07	13.35	0.00
2008	0.23	-0.03	0.07	13.35	0.03
2009	-0.20	0.14	0.06	13.30	0.02
2010	0.17	-0.03	0.07	13.34	-0.06

Appendix 3: the original data for the study

Year	TB	RER	GDP	WGDP	CPI
1970	593	7.1	7680	185268.22	0.16
1971	935	7.1	8001	193223.78	0.17
1972	774	7.1	8539	208670.68	0.19
1973	1,070	7.0	8800	225034.98	0.21
1974	2,649	7.1	9020	222483.69	0.23
1975	3,102	7.4	9553	229568.44	0.30
1976	1,484	8.4	21652	238581.63	0.32
1977	1,814	8.3	23419	249174.71	0.35
1978	5,299	7.7	23301	262364.27	0.39
1979	4,679	8.2	23439	275887.58	0.44
1980	5,656	8.2	23419	301583.05	0.58
1981	5,132	8.3	23301	314179.74	0.73
1982	6,461	9.3	23439	324556.94	0.93
1983	4,361	11.1	22886	334941.03	1.18
1984	4,770	15.3	23656	336044.42	1.61
1985	11,194	17.5	24742	372014.35	2.14
1986	19,522	32.7	25070	382901.03	2.83
1987	42,639	64.3	1071540.814	398668.18	3.68
1988	53,958	99.3	1119016.391	427083.39	4.82
1989	94,100	143.4	1147744.846	450006.34	6.30
1990	199,453	195.1	1219236.554	474679.76	8.55
1991	236,120	219.2	1253131.532	490037.14	11.01
1992	327,545	297.7	1275916.092	495074.08	13.43
1993	433,622	405.3	1281007.624	497205.86	16.66
1994	500,809	509.6	1298941.68	503005.19	22.54
1995	495,747	574.8	1345247.265	513850.03	28.72
1996	352,056	580.0	1401711.872	528660.89	34.74
1997	243,729	612.1	1448213.333	538541.07	40.34
1998	495,124	664.7	7803929	530464.26	45.50
1999	605,767	797.3	8181669	531950.35	49.09
2000	507,407	800.4	8585340	548161.15	52.00
2001	622,621	871.5	9100274	550702.91	54.68

2002	512,516	969.9	9752177	553999.26	57.58
2003	741,426	1038.4	10423734	564003.72	60.64
2004	1,090,818	1089.3	11239735	581489.74	63.51
2005	1,490,323	1128.9	12068090	595832.01	66.71
2006	2,450,751	1251.9	12881163	611564.05	71.54
2007	3,263,294	1245.0	13801920.84	629955.41	76.57
2008	4,105,287	1195.8	14828344.81	626976.12	84.44
2009	3,351,264	1318.7	15721300.63	595542.63	94.69
2010	3,970,857	1409.3	16828563.21	622866.81	99.87

Appendix 4: Trade balance from 1970 to 2014

Year	TB	Year	TB	Year	TB
1970	0.79	1985	0.28	2000	0.44
1971	0.71	1986	0.37	2001	0.45
1972	0.80	1987	0.31	2002	0.54
1973	0.74	1988	0.33	2003	0.53
1974	0.53	1989	0.35	2004	0.51
1975	0.48	1990	0.24	2005	0.51
1976	0.68	1991	0.22	2006	0.41
1977	0.68	1992	0.26	2007	0.42
1978	0.68	1993	0.29	2008	0.42
1979	0.42	1994	0.35	2009	0.46
1980	0.45	1995	0.40	2010	0.49
1981	0.41	1996	0.51	2011	
1982	0.48	1997	0.56	2012	
1983	0.38	1998	0.41	2014	
1984	0.47	1999	0.35	2014	

Year	Export/Import (TB)	Tzs/US exchange rate
1970	0.790325418	7.14

1971	0.701797506	7.14
1972	0.802185224	7.14
1973	0.741908594	7.02
1974	0.535261298	7.13
1975	0.484063047	7.37
1976	0.68846729	8.38
1977	0.681334199	8.29
1978	0.417037963	7.71
1979	0.451427312	8.22
1980	0.406625922	8.20

Year	Balance of trade	Exchange rate
1981	0.483191293	8.28
1982	0.394675683	9.28
1983	0.466114678	11.14
1984	0.454573708	15.29
1985	0.285112641	17.47
1986	0.369068254	32.70
1987	0.311964948	64.26
1988	0.334549908	99.29
1989	0.350792407	143.38
1990	0.242762723	195.06

Appendix 5:Trade balance and exchange rate for the period 2001 to 2010

Year	Trade balance	Exchange rate
2001	0.452792789	876.40

2002	0.544452475	966.60
2003	0.531516654	1,038.90
2004	0.538987328	1,089.10
2005	0.509049677	1,129.20
2006	0.408032868	1,253.90
2007	0.416657537	1,244.10
2008	0.415308529	1,196.30
2009	0.455980525	1,319.90
2010	0.4905522	1,432.30

Year	Trade balance	Exchange rate
1991	0.220384082	219.16
1992	0.275798701	297.71
1993	0.294074579	405.27
1994	0.346293929	509.63
1995	0.402904295	574.76
1996	0.565897964	579.98
1997	0.561313443	612.12
1998	0.405142284	664.70
1999	0.354785513	744.80
2000	0.43551477	800.4

Appendix 6: Data for the Crisis period 1979-1985

	1979	1980	1981	1982	1983	1984	1985
Per capital income growth %	0.2	0.2	-3.7	-2.6	-5.6	0.2	1.4

Population growth %	3.1	3.2	3.2	3.2	3.2	3.2	3.2
Urbanization %	13.9	14.8	15.4	15.9	16.5	17.0	17.6
Terms of Trade	139	142	129	127	128	131	126
External debt Million $	2070	2450	2880	3130	3390	3620	4030
Interest rate spread %	7.5	7.5	8.0	8.0	9.0	9.0	7.8
% labour force in agriculture	86.3	85.6	85.6	85.5	85.4	85.2	85.1
Monetary growth %	46.9	26.9	18.1	19.5	17.8	3.7	30.3
Inflation %	12.2	26.4	22.8	25.4	23.5	30.9	28.7
Gross investment% of GDP	33.6	33.1	28.6	26.0	19.3	20.2	18.7

Sources: Income and investment data from World Development Indicators (1998).